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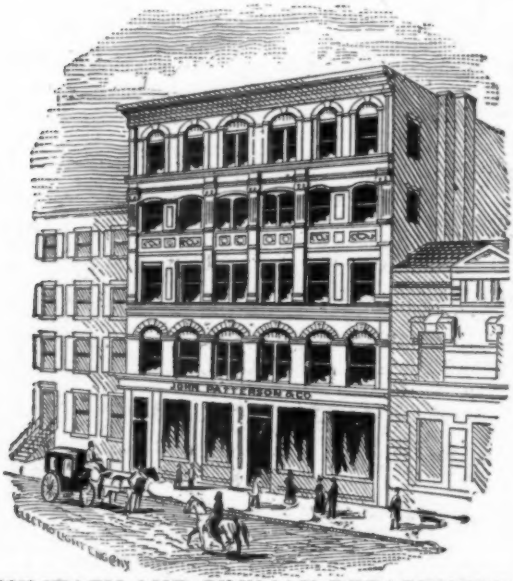

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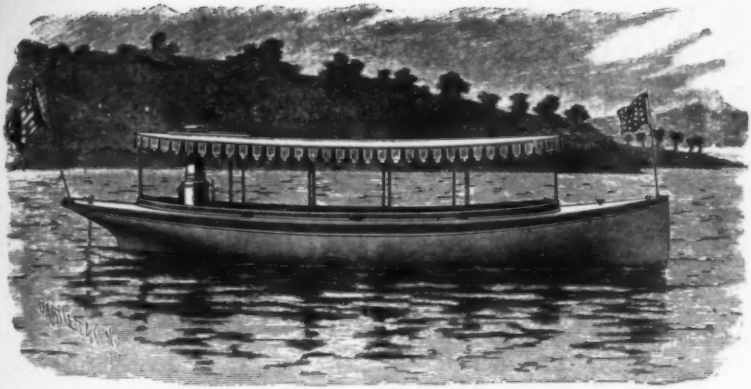

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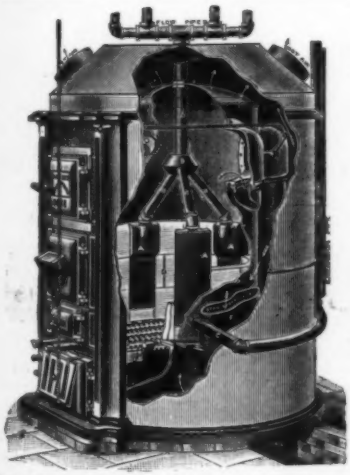

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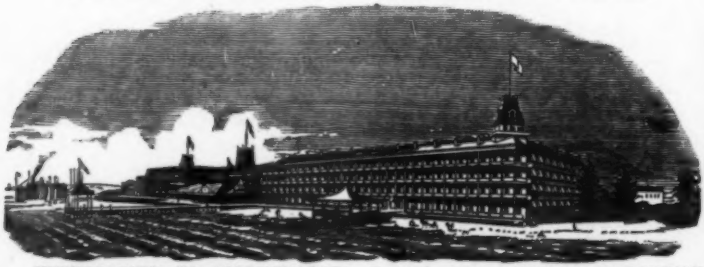

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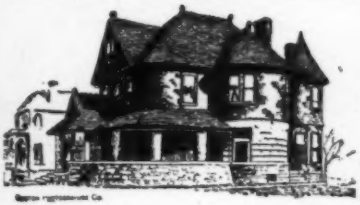

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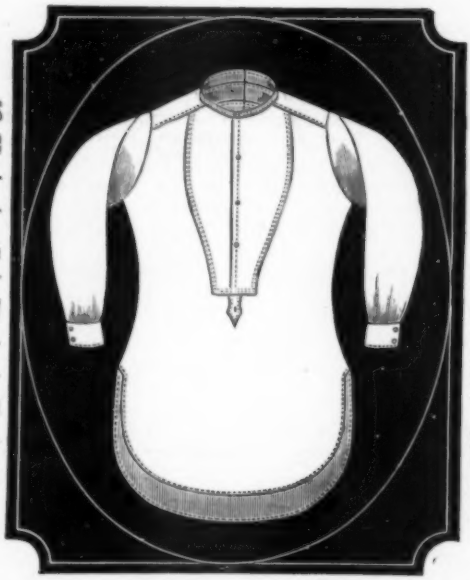

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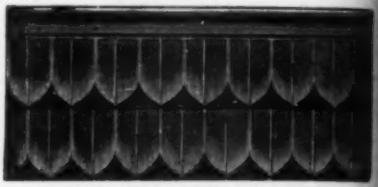

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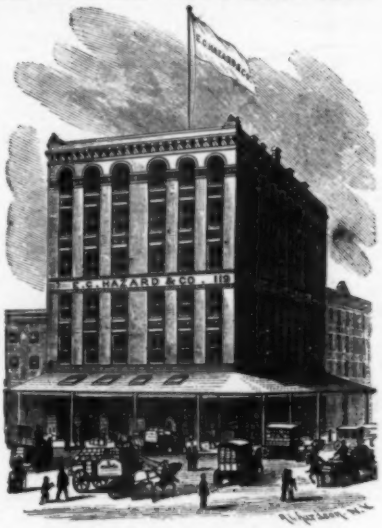

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VOL. XII. SEPTEMBER, 1891. NO. LIII.

THE NORTHERN VOLUNTEERS.*

BY COLONEL THOMAS L. LIVERMORE.

IN 1861 there were 4,000,000 men fit for military service in the loyal States. Over two millions volunteered for service against the Rebellion. Five thousand commissioned officers and ninety thousand enlisted men were killed in action or died of wounds while in the service, and several times as many were wounded and survived. Over two thousand commissioned officers and one hundred and seventy thousand enlisted men died of disease in the service.

Nothing can aid the imagination, so well as this record, to conceive the magnitude of the service rendered by the volunteers, and the hardship, exposure and fatigue which they underwent.

WHAT MEN WERE THE VOLUNTEERS?

All classes went into the Army,—farmers, mechanics, traders, students and the members of all the learned professions. The rank and file were mainly young men. The average age of those who enlisted before the draft was resorted to, was between 24 and 25 years. Men near the middle age who went from civil life into service in the field seldom endured its hardships long. It was the young men who bore the brunt of war.

The Comte de Paris says that " the volunteers who responded

*Read before the Military Historical Society of Massachusetts, 1883.

to Mr. Lincoln's first call for troops" were "inferior in quality to those who composed the subsequent levies," and that they were not of the working classes, but were "picked up among the unemployed both in town and country." This statement needs great qualification. It is true that some of the three months' regiments which were raised in the large cities were of this character, but many were not, as, for instance, the 7th and 9th New York Militia, and the eastern and western regiments raised outside of the large cities. Out of the seventy-six enlisted men in one company of the 1st N. H. Volunteers,—a three months' regiment,—twenty-two afterwards held commissions in other organizations. This company was recruited in the common way, and there is no reason to suppose that there were not many companies of equally good material in the three months' service.

All the three months' regiments were more or less ineffective from want of training, but it may be relied upon that, with the exceptions before named, the character of the men was not such as to prevent their being made thoroughly effective soldiers.

The Comte de Paris, like all other foreign writers on the War of the Rebellion, recognizes the fact that in the main the volunteers were of our very best. He points out the fact that two-thirds of our Army were native Americans, and he says, "The soldiers born on American soil were more numerous than if the army had been recruited by a draft bearing equally on all citizens of the Union." He draws this conclusion from statistics.

The personal character of the volunteers is exhibited very well by a comparison of the number of deserters from their ranks, with the number of deserters from the Regular Army. The latter were 244.25 to the thousand. The former were 62.51 to the thousand. Of the deserters charged against the volunteer force a large number were substitutes, who were, to use the words of the provost-marshal-general's report, "a vast number of adventurers, unworthy of any country, who had no affection for the Republic, and who only enlisted for money." The whole number of desertions from the volunteers prior to April 1, 1863, and before substitutes were enlisted, was reported as 88,573, which the provost-marshal-general says should be reduced 25 per cent. for technical cases and repeated desertions by the same men. The number who had enlisted during that time were 1,342,110. The desertions were then a little under fifty to the thousand.

The substitutes and mercenaries of foreign birth, who were

attracted to the volunteer service by large bounties, were worse than a bad element. They brought disgrace on the name of good regiments by deserting by hundreds. They sometimes went over to the enemy from the picket line itself.

There is nothing more humiliating to the American people than the record of this sending by our fellow citizens, who were unwilling to go to the war, of hordes of mercenaries of the meanest character, to join the regiments in the field. It is but justice to say, however, that some of these substitutes,—perhaps a third,—were faithful to their contract, and remained in the ranks and fought well.

The volunteers who were drawn into the service late in the war by high bounties, although subject to some reproach at the time for tardy patriotism, were good men and made good soldiers. Many of them had families whom they could not leave until the bounties assured them the means of support.

The most of the volunteers were led to enlist by patriotism. Neither want, love of glory, greed of high pay, nor a spirit of unrest, could account for the enlistment of more than half of the able-bodied men of the North. It was because of the high character and earnest patriotism of the men in the ranks, that they were turned so quickly from raw recruits into good soldiers.

The military historian is apt to write of the army whose deeds he tells, as if it were divided into two dissimilar parts—the officers and the men. In victory the men are credited with native courage, enthusiasm for their leaders, or hatred of the enemy, but never with the moral courage which springs from love of country or the justice of their cause.

In defeat they are said to have fled despite their officers, as if they were beings of a different order and subject to terrors of the imagination to which their officers were strangers. This may serve for standing armies in which the ranks are filled with mercenaries or peasantry. It was different in our volunteer forces. Officers and men were equal in civil life, according to their ability, attainments and property. For the most part all had earned their living. In general those who, by education, wealth, or political eminence, were the most prominent in civil life, were selected as officers at the outset; but the ranks held plenty of men of the same fibre, and of good education and character. Vacancies, caused by the many casualties among officers as the war went along, were filled from the ranks as a rule. As an in-

stance of this, the writer will cite the 5th New Hampshire Volunteers, in which he served. This regiment came out of the war with only one officer who was commissioned at first. All the rest, but two, had risen from the ranks. Much the same state of the roster existed in many regiments. The casualties among officers became so numerous late in the war, that many men were promoted from the ranks who had neither the education nor character to have lifted them above the mass in civil life. But, upon the whole, they made good officers. Experience in the field made up for their shortcomings.

It could be said much more truly of the Union volunteers than it was of Napoleon's soldiers, that each one carried a marshal's baton in his knapsack. The gentleman apprentice, like de Fezensac, who had respect paid him by his comrades because he had "a louis a day to eat of his own," and who took his turn at sweeping and cooking by proxy, or quit his post as sentinel before the proper time by connivance of the corporal, was unknown among the Union volunteers.

Our soldiers had the same aspirations, born of patriotism, as the officers had. The same reflection, that this Government was their inheritance, and that they waged war to keep it whole for their children and their children's children, impelled them to the performance of duty and hardened them to toil and peril. They shared with the officers the robust scorn of cowardice and the unflagging resolution which mark the Anglo-Saxon. No class tradition had usurped from them the birthright of nobility, in thought, act, or instinct. All this is consistent with the fact that the ranks looked to the officers for the example of good conduct, and that they needed the enforcement of discipline. And it is not inconsistent with the fact that education and social influences and tradition had made a wide difference among the men who went into the Army, respecting good faith in doing duty, unselfishness, truthfulness, and, in short, the sense of honor. It was to these traits in the commissioned officers that the *morale* of the Army was greatly due.

No review of this character would be complete, which omitted to recall the fact that the vast army of volunteers disbanded without tumult, and dispersed themselves among the people leaving no sign to stain their memory. They were neither hardened by bloodshed, nor unsettled by life in the camps. With but few exceptions they were better citizens for their military

life. The tone of the whole nation was raised by this host of men, whose souls had been enlarged by the exercise of that courage and unselfishness which had led them to expose their lives for their country's sake.

THE OFFICERS.

M. Roussillon, a French officer, writing after the war from evidence drawn from written accounts of our Army, said: "The vicious mode of recruiting the Army had for a consequence the raising to the position of officers not only men devoid of military instruction, but sometimes men of unsavory antecedents. This resulted in little confidence between officers, little *esprit de corps*, and often even political quarrels. Those officers who came out of the military school of West Point were often held in jealous regard by their colleagues, and on their part did not conceal from the latter their small consideration." *

The Comte de Paris, too, in his "History of the Civil War in America," says that the election of officers was the prevailing method of choosing them in several States, but that in the formation of new regiments "there were certain circumstances which interfered with the choice of the soldiers as well as that of the governor. Whether it was owing to some tacit agreement or a positive contract between the governor and the principal recruiting agents, the latter were generally made sure in advance of grades proportionate to the importance of the service rendered." He likens the man who, by his activity, influence, and money, raised a regiment and so got the command of it, to the ancient proprietary colonel, or the commander of the independent company of cavalry of the Middle Ages. Such a man, he says, was unlike the officers of the Regular Army "who can only rise to superior rank in the order of seniority"; but he "became the colonel of that regiment by right, and without positive proof of unworthiness he could not be deprived of his command, unless indeed the difficulty was compromised by making him a general."

The inference might be drawn from this statement that any other colonel could have been deprived of his regiment without proof of unworthiness, but this inaccuracy serves to point so bright a witticism that it can be forgiven.

These generalizations were, no doubt, founded upon instances

* "Puissance Militaire des Etats Unis d'Amerique d'aprés la guerre de la Secession, 1861–1865."

of bad appointments, numerous enough to attract attention; but they give a wrong idea to the reader in that they leave him to suppose that these faulty methods of selecting officers were practised so generally as to mould the character of the Army for the worse.

General de Chanal, of the French Army, who observed the operations of our Army from March, 1864, to January, 1865, writing some years after the work of his friend, M. Roussillon, above cited, had been published, gives an account of our officers which describes the generality of them much more accurately. He says: "By the very fact of these immense levies of men electing their officers or receiving them from the local authorities, the social hierarchy, transported to the army, has become the military hierarchy; and it has not had the need of surrounding itself with all the precautions which are necessary for safely guarding an institution which has no other base than the severity of its regulations. * * *

"If the severity of the examining board has been able to correct the errors of elections, these latter were peculiarly helped by the presence in all walks of civil life of a throng of former scholars of West Point, and never has the profound truth of the words of President Monroe: 'That a military school is necessary not only to fill the ranks of the offices of the army, but to form in each generation, a certain number of citizens depositaries of the science of war and charged with popularizing it in each of the States of the nation,' received more evident consecration.

"Too few in number to pretend to the exclusive privilege of the defense of the country; too much imbued with the duties of the citizen to suppose themselves entitled to any other right than to serve, the Regular Army placed its organization and its personnel at the service of the volunteer army. The aptitude of each was the sovereign rule."* It is not within the scope of this essay to define the attitude of the West Pointers in the war; but let it be said in passing, as a tribute to that admirable body of men, that this is the true light in which to regard their position in the war. Jealousy of them existed in places it is true, and a well-founded contempt on their part for the gross and persistent ignorance of some volunteer officers was not concealed, but in the main there was complete confidence and cöoperation between the West Pointers and the volunteers.

* "L'armée Americaine."

The means are not at hand to determine how many States submitted the choice of officers to the enlisted men, but certainly the instances of it in the field were so few, if they occurred at all, as to escape general notice. It seems as if the militia had been confounded with the volunteers in this respect, by the authors above cited.

There is no doubt that many of the officers of the volunteers who were appointed by the President, that is to say, the generals and the staff, were appointed through political influence or for reasons of state. The generals appointed in this way were often very poor officers, but they were usually relegated to posts where they could do no harm when they had been found to be inefficient in the field. As for the staff, political appointments were usually confined to the non-combatants, and such is the American aptitude for administration that these officers generally were efficient. A certain measure of ability was essential as a rule to obtain political favor, and, where a multitude of staff officers had to be created from the ranks of the citizens, it is not at all certain that any other method than that which was adopted could have selected more native ability of the sort wanted, than was brought into such departments as the paymaster's, the commissary's, and the quartermaster's.

The practical turn of mind in the American was alone sufficient to make him seek out the men of military skill in the community for regimental officers. With one accord, East and West, those who had the selection of officers turned first to the graduates of West Point and other old soldiers. A notable instance of this was witnessed by the writer in Galena, Illinois, at the outbreak of the war. A company of infantry was raised in three days, and, while the uniforms were yet in the hands of the clothiers, it set to drilling with the greatest earnestness. The man of all men in the place to whom every one turned, was Captain U. S. Grant; and he, in civilian dress, with a quiet and business-like air —ramrod in hand—set to work drilling these men in the step, wheel and facings, and so took the first round in the ladder of fame. He went to the State capital with the company, and was at once employed by the Governor in the organization of the State troops. It is safe to say that there was not a man of military skill and reputable character in the country, who was not commissioned in the volunteers, if he desired; and even the militia officers and foremen of fire companies were often taken be-

cause of their knowledge of tactics, limited as it was. Many men received commissions who proved to be unfit; but the fact that a man received his commission because he had recruited a company, or because he had money, or because he was prominent in politics, did not prove that he was unfit to be commissioned. On the contrary, it showed that he had at least energy, or industry, or the esteem of the community, and the chances would have been that the selection of officers by the governors of States merely upon such advice as to their military talent as they could get in the hurry of raising the troops, would not have gathered in more officers fit to be trained for their places than were obtained by the methods actually practised. It must be admitted, though, that it would have been better to take officers from the field for the later regiments, than to appoint civilians, as was done in many instances.

The election of officers by the men was, without doubt, hurtful to discipline, but as stated above, this was a practice not much followed by regiments in the field, if the writer's impressions are not wrong.

DISCIPLINE.

General Washington said that it was necessary that a most perfect despotism should exist in an army. But, when we consider that he commanded an army of native Americans, and that they had thrown their all into the scale against their king,—that they were, of their own will, rebels, in a day when that title was full of danger, we may doubt whether Washington meant more than that orders must be absolutely obeyed, as far as his army was concerned. It is necessary to enforce a despotism in an army of mercenaries or conscripts, which demands from the private soldier the utter surrender of autonomy, and which requires servility as the sign of this surrender. In such an army the instinct of obedience and the obligation of respect to officers must be bred and trained by the minute exactions of a discipline framed for every hour and fitted for every occasion.

The same approach to despotism which was needful in the Continental army was needful in the volunteer forces of 1861–65. The Comte de Paris says with justice: "So long as that absolute despotism alluded to by Washington did not impose the same obligations upon the timid, to be found everywhere, as upon the bravest," our volunteers could not escape the contagious effects

of hesitation by the faint hearted in battle, as "the inevitable consequences of the human character." But this despotism was not necessary to imbue the volunteers generally with the habit of obeying and upholding constituted authority. They enlisted for this purpose. What they needed was instruction.

Roussillon says of the soldiers of the two armies: "The democratic ideas hurt subordination among the soldiers. On the other hand, the absence of honorable rewards, such as our decorations, or of pecuniary recompense like our retiring pensions, was felt when they experienced the need of encouraging bravery or of recognizing good conduct. They adopted in the two armies sombre uniforms, blue in the North, grey or brown in the South, which gave the troops a sad aspect, in sympathy with the cast of mind of the men of the North. In their camps there never were as in ours, high spirits, gayety and songs. The bands were bad and played rueful airs. Many of the soldiers were married, but the law did not, at the beginning of the war, guarantee any pension, whether to the wounded, the widows or the orphans. A man lost an arm,—they gave him his 300 francs to buy a false arm. A leg cost a little more, but that was all. There was on this account in America a veritable gap in the whole means put to use with so much success in European armies, to create and preserve discipline. American officers have so little authority, that it is the custom to resort for everything to courts-martial, convened as often at the demand of the subordinate as upon the complaint of the superior. Privileges abused, wrongful absence and desertion, facilitated by the many rapid lines of communication, render the effective force always variable. There exists in the armies no kind of gendarmerie or police force whatever. It often results that one part of the troops employ the night in watching, to prevent the other part from leaving camp, which increases the fatigues of the service without much benefit. Finally, the spirit of individual independence which is, so to speak, the ruling characteristic of the American mind, and which produces such happy effects in civil life, is the greatest obstacle which stands in the way of the maintenance of that discipline without which a good army is not durable or even possible."

Leaving out the want of the sentimental incentives to good conduct, the absence of which M. Roussillon emphasizes, the picture which he has drawn might portray the militia in time of peace, but it certainly does not represent the volunteers in the

war. Every one who served with the volunteers knows that the formality of a court-martial of an enlisted man was resorted to only for grave offenses. The lighter offenses were punished summarily and effectively by the commanders of regiments and companies, and usually at their discretion. It is one of the highest proofs of the intention of the volunteers to uphold authority that from the first, they carried out the orders for the infliction of these summary punishments readily and without inquiry into their legality. Whether courts-martial of officers were more or less frequent than they are in foreign armies the writer does not know, but it is certain that arrest or suspension from duty at the discretion of superiors was much more frequently resorted to than courts-martial. It is difficult to believe that under any constitutional government, punishment of officers proceeds farther without the sentence of a court.

M. Roussillon's criticism of our guard system leads to the supposition that he had not heard of our provost guards. It is true, as he says, that a part of the troops often served as sentinels around the camps and that their duties embraced the preventing men from quitting camp without leave.

There is no doubt that the spirit of individual independence—the democratic idea—which is bred in us was opposed to any sort of servile deference, such as is exacted from the soldiers of standing armies by the officers; and yet, although the men were quick to detect incompetency in their officers, they obeyed their orders, and, where they were properly instructed, they paid their officers the formal tributes of respect which the regulations required. New regiments were apt to complain of the enforcement of discipline because they could not see the need of it. They were willing to obey their officers, and were anxious to learn how to handle their arms and to manœuvre, but they were impatient of the constant exactions which were made upon them in camp. But, as soon as they had been in battle, a new intelligence ran through the ranks. The need of shaping every action to the supreme moment when skillful command and exact obedience became the price of victory and even of safety, then became clear to the minds of the men. Thereafter, although they might grumble, they not only were reconciled to discipline among themselves, but they held in scorn those regiments in which there was lax discipline. It is not meant that there were not in every regiment numbers of men whom no experience could teach to like disci-

pline, and who always needed it. There was enough of it for such men in regiments which were well commanded.

It is pleasant to read the frank testimony of General de Chanal to the discipline of the American volunteers. He says: "In the main, and in that which is essential, the discipline is as good, if not better, than in the European armies, but it has not the external marks. It is this which may deceive the observer who merely passes through the American Army. * * * * Few troops are so submissive to their commanders; and during the whole war, among more than two million soldiers who appeared in the ranks, there were only seven military executions." Whether this is an understatement of the number of military executions or not, it is true that the execution of a volunteer of American birth was a very rare incident of the war. General de Chanal has described the state of discipline with great discrimination.

The Comte de Paris, speaking of the early volunteers, says: "Easily impressed, like all multitudes, these men, accustomed to complete freedom of action, went into battle in a spirit of obedience, which is rather rational than passive, and were actuated more by a sense of duty as citizens than by the habitude of the disciplined soldier who forgets his own volition to follow that of his chief." This was true to a degree of the volunteers all through the war, but still good officers—even a good colonel—made a good regiment. Bad officers made bad regiments. The rough horror of war was very apt to weed out the unworthy in a long campaign, but some troops served too short a time to allow the "survival of the fittest" to reform their rosters, and a few three years' regiments, even, never got righted. But after a campaign the most of them were well disciplined, and each army in the field had a solid and reliable body which could always be relied on whatever the conduct of the raw troops was. The Army of the Potomac at Gettysburg was a conspicuous example. Nearly every regiment was under fire, and good conduct was almost universal. Although there doubtless were in every regiment of volunteers not only the timid who had to be held up to their work in battle by discipline, but others, such as the careless, and the hot-headed, and those whose previous life had made them vicious or unruly, upon whom the heavy hand of discipline had to be placed, yet the larger part of the men were citizens in whose minds respect for law and order had been bred and trained from childhood, and whose willingness to obey constituted authority rested

on firmer foundations than the daily exactions of military rules and etiquette. It was not necessary to build up a mechanical habit of obedience in them.

Serious refusals to obey orders were of the rarest occurrence. Mutinies were almost unheard of.

MILITARY SKILL.

Respecting the degree of military skill in our army, Roussillon says briefly: "The officers in their turn, commanding troops inexperienced and little hardened to war, had acquired the habit of intrenching much, which led to a protracted though murderous war. Thus, for example, the skirmishers, as well as the advanced posts and the sentinels, always dug themselves rifle-pits, or *trous de loup*, arranged for musketry firing."

The Comte de Paris says that in the early part of the war: "For want of that mechanism, which in well-regulated armies communicates the will of the directing power to each man as rapidly as the nerves in the human body, they were frequently to lose the opportunity of turning a first advantage into a decisive victory."

General de Chanal says: "But patriotism, devotion, discipline, could not replace military science; the American soldier had to acquire it upon the field of battle, often indeed to his cost. He learned only that which was necessary to him for the kind of war which he waged. Little broken to the grand parade movements which render troops manœuvrers and make them the docile instrument of the tactician, he has a certain heaviness which would be fatal to him before European troops operating in the country of the elder continent. But one searches in vain in America for plains like that of the Camp of Chalons, where so many armies have come to hurl themselves together as in an arena prepared in advance. The forest—clearings where some divisions can barely deploy—then again the forest—such is the common country of the battles of Secession. At the Wilderness the two armies fought during three days in the midst of thickets almost impenetrable; once only was there a clearing large enough to permit the use of cannon. An aide-de-camp of General Meade, who, during those three days was continually under fire, did not at any time see the whole of a regiment drawn up."

It may be, as Roussillon says, that our officers acquired the habit of intrenching more than European standards would allow, but it was not because the troops were inexperienced or unused

to war. The Army of the Potomac did not intrench in the field except in beleaguering Yorktown and Richmond, until, after more than a year of campaigning, it threw up slight earthworks at Chancellorsville. In the meantime it had fought fifteen battles, including the bloody contests at Fair Oaks, the 2d Bull Run, Antietam, Fredericksburg, and the Seven Days' battles. At Chancellorsville the dense woods and thickets, which rendered the movements of the enemy invisible, made the use of tactics impossible, and to intrench was wisdom because the battle had become defensive. At Gettysburg the thick woods and difficult country on the right put tactics out of the question, and intrenchments were justified by the defensive attitude along the whole line of the second and third days. The slight intrenchments in front of the 2d Corps were thrown up to defend the position ; they were in no sense an obstacle to manœuvring, and they afforded no shelter to our men when they rose up to repel the charge of Pickett's men. The campaign of 1864 between the armies in Virginia was like the struggle of two mighty wrestlers, neither of whom would let go. General Grant gave no ground after any repulse. To have fallen back at all would have impaired the *morale* of both army and nation ; to have retreated would have been more dangerous than to stay. No one would contend that it would have been wise to attempt to hold the positions maintained by the army under Grant without intrenching. It would have been impossible. When once the enemy were forced from their intrenchments at Petersburg, the spade was cheerfully thrown down. At Five Forks, Sailor's Creek, Farmville and Appomatox Court House, the army under Grant forgot the habit of intrenching.

We owe a very rigid self-examination to ourselves, when so friendly a critic as General de Chanal alleges that our troops were too unwieldy to have encountered European soldiers in an open country. It was, as he says, in the very campaign itself that our soldiers had to learn much of what was essential. The winter of 1861–62 was all too short to perfect our troops in tactics. The Army of the Potomac had not had even the review of 20,000 men together when it marched against the enemy in 1862. The men who, in 1861, were to be made into soldiers, with very few exceptions, had not had the elements of military instruction. Their carriage and gait had to be made over. The elements of celerity and promptness had to be drilled into them. The time for a setting up such as regulars have could not be afforded, and,

although the volunteers, after a campaign or two, acquired a fine carriage and a straightforward and regular stride, they seldom displayed the figure and movement of the regular soldier. As soon as they had learned to face and wheel and march straight ahead with tolerably regular step, they were taught to move by companies and regiments; and, when they entered the campaign of 1862, they understood the commands and tactical movements, and upon favorable ground most regiments could march a little way in line of battle, change front, and fire with regularity; but they had not acquired that familiarity with tactics and each other which enables a line of old soldiers to move forward shoulder to shoulder, over obstacles, if need be, without that anxious effort to preserve the alignment which tends so much to destroy it. We cannot but confess that our Army would not have been fit to execute any very rapid manœuvres on the field of battle in an open country, when it entered the campaign of 1862, although we may contend that it was different afterwards. The most of the officers had themselves to learn what they were to teach the men. When a regiment was fortunate enough to have one or two field officers of military education, both military discipline and skill were taken on with rapidity by company officers and men, and, with the intelligence which filled the ranks of the volunteers, if every company could have had graduates of West Point for officers in the outset, they would have become fit to cope with any soldiers in the world in the field in the time which was taken to prepare the Army of the Potomac for the field. The best military establishment which the Government of the United States could maintain as a reserve, would be that created by turning out a thousand officers a year from the military school at West Point and sending them into civil life to wait, ready, if the need ever came, to turn our volunteers into soldiers.

Before the end of 1862 our regiments became equal to tactics in the face of the enemy. At Antietam the greater part of the field was as open as that of Waterloo. Although no great tactical manœuvres such as might have been employed, were resorted to by the commander of the army or his corps generals, yet, in parts of the field where opportunity was presented, the ability of the regiments of the Peninsular campaign was manifested in some brilliant manœuvres. Under a severe fire of artillery and musketry at short range they charged in line, they changed front to meet flank attacks and they manœuvred around

the flank of the enemy; lines relieved lines by companies breaking to front and rear and coming into line again; and in one instance a regiment went to the aid of its neighbor on the left under a heavy fire by passing along its rear and then coming into line on its left and opening fire as it arrived on the line. It must be admitted, however, that the regiments referred to had been reduced by war to half their original size, and were therefore more easily wielded than a full regiment of a thousand men would have been.

Later in the war tactics on a more extended scale were easily employed. In the retrograde movement from the Rapidan in October, 1863, General Warren faced the whole 2d Corps about at the Rappahannock and moved it in three lines of battle across a great open plain towards a party of the enemy who had been hanging on the rear. The movement was executed with precision and with great rapidity. In the pursuit of Lee the 2d Corps, on the 6th of April, 1865, pressed after the enemy for thirteen miles with four brigades in one line of battle, and the remainder of the corps in supporting columns. The route lay over hills, across ravines, and through forests and clearings. The enemy's rear guard made stands, sometimes with artillery, at intervals of about three miles. The line of battle of the 2d Corps, over a mile in length, swept on to each encounter without stopping even to align, and routed the enemy. It reached Sailor's Creek at evening in good order, and in a final charge precipitated the enemy into the creek, capturing many prisoners and a long train of wagons. During the day the Corps took 1700 prisoners and four guns. Doubtless other corps executed great tactical movements. The foregoing are cited because they were seen by the writer.

ENDURANCE.

The endurance of our volunteers was subjected to trials unusual with standing armies. The inexperience of the men in caring for themselves in camp, the ignorance of most of the officers of the essentials for preserving the health of the men, and of the injurious effects of pitching camp in low or malarious ground, and the want of skill in cooking, all did much to thin the ranks. Knowledge in these matters, more or less extensive, came with time, however, and the extraordinary skill of the men in constructing shelter, the abundant and regular rations which the

lavish hand and able administrative departments of the Government provided, and the liberal supply of clothing, all mitigated the evils resulting from ignorance of the art of living in camp.

There are no statistics available which enable us to compare the endurance of our soldiers with that of the soldiers of other armies under similar circumstances, but there is something to be learned by contrasting the number who died from disease and the number constantly sick in our Army, with those in the British Army in two wars and in time of peace. They are as follows:

Army.	Time.	Deaths.	Rate to 10,000.	Constantly sick. Rate to 10,000.
Union.	1861-65.	184,650	739	
British.	Peninsular War 1811-14.		1130	
British.	Crimea.		2020	
Union.	June 1861, to Feb. 1862.			1040
Union.	March 1862, to March 1863.			1690
British.	1861.			583

The "constantly sick" in the above table includes the sick not in the hospital in the Union Army, but only those in the hospital in the British Army.

The Comte de Paris says: "At the very outset the inexperience of the Federal volunteers was made evident, even more on the march than on the battle-field. In fact, a body of troops which has had no practice, cannot, with the best intentions in the world, make a long march without straggling on the road. We shall see at the end of the war Sherman's soldiers traversing half the continent, and conquering success through the vigor of their legs."

It is probable that such marches as Sherman's, rather than forced marches, are the best gauge of the endurance and effectiveness of an army, for the forced march is what the strongest can compel themselves to do, and not the test of endurance which brings the whole army to the critical point. In Sherman's march through the Carolinas and Virginia, the troops marched from

Raleigh to Manchester, 190 miles, in seven days, an average of over 27 miles a day. The Army of the Potomac likewise marched an average of 25 miles a day for several successive days on its way to Washington in May, 1865. We read that marches of 23 and 27 miles, in 18 to 19 hours, by two divisions of Germans on the way to Gravelotte were regarded as extraordinary.

The writer has not found any forced march by our troops equal to some made by the British and French. The division of General Friant came to the aid of the French at Austerlitz by a forced march of thirty-six leagues in forty-eight hours. Crawford's Division made sixty-two miles in twenty-six hours on the march to the field of Talavera; and afterwards, in the pursuit of Soult, marched forty miles in nineteen hours over mountain roads. But the division of Friant was much reduced by the forced march to Austerlitz; and Napier says of the mountain march of Crawford's Division: "Many men fell and died, convulsed and frothing at the mouth, while others whose spirit and strength had never before been quelled, leaned on their muskets and muttered in sullen tones that they yielded for the first time." The destructive effects of this march of forty miles, by Crawford's Division made under the inspiriting influences of the pursuit of a beaten foe, afford a strong contrast to the record of the previous march of sixty-two miles by the same division to Talavera, upon which we are told only seventy men gave out. And this shows how difficult it is to compare forced marches made at different times, in different seasons, and over different roads.

The 2d Corps on the march to Gettysburg, made thirty-two miles in twenty-two hours, but many of the men—probably one-half—gave out and lay down by the roadside. Jackson's Corps marched about sixty miles in thirty-eight to forty hours in turning Pope's flank, August 26 and 27, 1862. We read in the "Southern History of the War," by Pollard of this campaign as follows: "The route of the extraordinary marches of our troops presented for long and weary miles, the touching pictures of the trials of war. Broken down soldiers (not all stragglers) lined the road."

The Union volunteer did not, for a long time, carry through the marches knapsacks or uniforms for parade. He preferred to take a new uniform out of the liberal allowance of clothing or out of his pay at the end of a campaign to carrying one in his knapsack. The dull ache inflicted on the shoulders by the straps which held up knapsack, cartridge box, canteen and haversack,

was too much for his patience in the long campaigns under the torrid sun of the Southern States, and sacrificing appearances to comfort, he was prone to cast away the knapsack and all other superfluities, and carry his blankets and indispensible clothing in a roll thrown over his shoulder and across his body. Yankee ingenuity fell far short of its reputation in the equipment of our soldiers, or else the influence of tradition was too strong to allow the substitution of comfortable equipments and accoutrements for those described in the Army Regulations. Nothing was so hard to endure on the march as the pain inflicted by the narrow straps which supported the load of clothing, rations, water and ammunition. Nothing cast more gloom upon the ranks. The weariness of leg was far lighter to bear. Our friendly French critics have said that the volunteer did not learn at first to *adjust* his knapsack. The trouble was one which was more radical. The knapsack was wrong in structure.

The patient and unflagging industry of the volunteers in constructing earthworks has been remarked by all observers. The construction and use of these works contributed a new chapter to the science of war. Curiously enough that arch skirmisher, the Indian, has borrowed the art of intrenching from our troops, —a tribute to its merits from one who has inherited the art of skirmishing from an ancestry of centuries.

A soldier in the works at Hilton Head was reproved by his colonel for having a dirty gun. Said he in reply: "I know my gun is dirty, colonel, but I've got the brightest shovel you ever saw." This answer contains an epitome of many months of our operations, although our soldiers learned early in the war to keep their arms clean at all times.

TEMPERAMENT.

The shadowy atmosphere in which Roussillon saw our Army, with its uniforms of sad aspect, and with equally sad spirits, bad bands and rueful airs, existed, let us believe, only in an imagination which was unduly impressed with a superficial gravity which is sometimes seen in Americans.

It may as well be confessed at once that many of the bands were bad, but it was not because the army did not wish for good music. And it is true that the airs were often rueful, but that was due to the labor of the performers rather than the labor of the composer. But excellent bands were not

rare, and music both martial and lively enlivened the camps and parade grounds. There was nothing theatrical in the mould or manner of the American volunteer. He did not think it necessary to maintain professional appearances by assuming the light and reckless air of Colonel Fougas or Charles O'Malley. War was but a temporary business with him, and nothing but his manhood was on trial. But no soldiers ever threw off care more readily when the time was propitious. A thousand recollections of song and story, joke and merriment, come to mind with the memories of our campaigns. The march was often the time for endless banter and repartee and the swinging measure of the army song. The men were quick to apply *sobriquets*. The rosy youth was "Blossom," the man of great stature was "Baby." A regiment clad in shoddy was called the "Ragged Zouaves." A staff captain with drooping red moustache, arched eyebrows, long face and pointed chin, was known among the men as "the Jack of Diamonds." Old General Sumner, of deep voice and headstrong courage, was affectionately called by them among themselves, "the Big Bull of Bashan." The erect and robust form of General Hancock and his partiality for the front gave him the title of "the King Pin," with his admiring soldiers. Another general, who was thought to stay too far in the rear, got the prefix of "Long Range." At Sailor's Creek, when the end of the war was seen to be close at hand by every man in the ranks, millions of dollars in Confederate notes were captured, and were passed around among the men. As a long line of prisoners filed by in the road, they were accosted with the cheery but earnest inquiry: "Halloa, Johnny! Have you been paid off lately?" And when the expected reply in the negative came, our jocund men passed out the notes by the handful to their old antagonists. The humor and irony of this act was of the finest sort. It was the playful announcement from the men in the Union ranks to the men in the Confederate ranks that the game was up.

The day of sack and rapine among civilized nations has gone by, and it was not to be expected that American soldiers should be guilty of them. It is true that our soldiers, looking upon the rebellion as one of the whole people of the South, notwithstanding orders to the contrary, would lay hands on everything eatable which the inhabitants of the country had. At Fredericksburg, too, it must be confessed, some of the houses were emptied into the street. This seemed at the time to be done as a sort of bear-

play rather than in a spirit of rapine. It doubtless was incited by the fact that the people had left the city, and the enemy had used the houses to fire from. Isolated houses which had been abandoned were often burned by stragglers, but it was seldom that this appeared to be done deliberately. But, with these exceptions, no instance of any considerable destruction of property except under orders, has come to the notice of the writer. And, although cities were repeatedly taken both by siege and assault, as at Fredericksburg, Petersburg, Atlanta, Columbia, Richmond, New Orleans, Savannah and Mobile, no instance of general incendiarism, sack, drunken riot, or violence to women, ever occurred.

CONDUCT IN THE PRESENCE OF THE ENEMY.

The conduct of the volunteers in the presence of the enemy can be compared with that of European soldiers in various respects where the conditions were alike, but there was one very important service in our war which has not often found an important place in the wars of modern Europe. The deep veil of sunless forest which covers so much of the country in which we fought, gave so great a chance for concealment, that whether the line of battle was moving or at rest, it was needful to cover its front at a long reach ahead with the line of pickets or skirmishers to detect the enemy's advance in time to get ready for him, or to draw his fire if at rest and so forewarn the line moving forward to attack him. This necessity does not exist in a country where the movements of the hostile forces are seen by each other at long distances.

It was in such a service as this that the intelligence and self-reliance of the American volunteer were of the greatest value. The line of skirmishers under a field officer, and the line of pickets under a "brigade officer of the day," was sometimes a mile long. The men were separated by intervals of five paces and oftentimes more. The trees and undergrowth often hid the men from the view of even the subalterns, and the commanding officer had to trust to his hearing and military instinct as much as his sight to tell him how the combat went on with his line. The men did not have the moral support which the touch of shoulder to shoulder gives in line of battle, and the soul and heart of each man had to keep him up without the stimulus of exhortation from the officers or the fear

of reprimand or punishment. In spite of all the weaknesses of the formation, the skirmish line more than once bore the brunt of battle and won in great events; as, for instance, at Chancellorsville, where the skirmish line of Hancock's division, under the gallant Miles, beat back the attack of McLaws' division; and at Petersburg, on the 15th of June, 1864, when a part of the formidable works in front of that place were carried by a skirmish line under a heavy fire. The examples of the use of skirmishers in the Franco-German War do not afford a parallel. The open order was resorted to by the Germans as offering less of a mark for the rapid and far-reaching fire of modern arms, but the men were still under the eyes of their officers.

The service on the picket line at night in the dark recesses of the Southern forests was a great trial of the *morale* of the soldiers. In front of Richmond during the whole month of June, 1862, the Army, then new to this phase of war, maintained its picket line in the woods and thickets within rifle shot, and sometimes within pistol shot, of the enemy's pickets. Hardly an hour passed, day or night, without the sound of the rifle, often followed by the roar of shells whirling over the crouching pickets. Unused to reading the signs of war, for a long time every soldier on picket was tense with the feeling that each outbreak of arms might be the signal for an attack. The keenest vigilance possessed every man. Without the element of strong and self-reliant character in the soldier, the picket line at this time would have been the source of constant alarm to the Army. Indeed, the impulsive foreigners, who composed some regiments, were almost sure to rouse the camp at night with the roll of musketry under the alarm caused by a few rapid shots from the enemy's pickets; and sometimes they ran into the main line. In such cases the general in command of that part of the line was very apt to insure sleep for the rest of the night by sending a Yankee regiment out to the deserted picket line. War has more glorious service than that on the picket line, but none which requires more intelligence or greater steadfastness in the private soldier. To one who served on the picket line in the trying times of 1862, the faithful, brave and resolute character of the men in general, as displayed in that service, is a grateful memory. However near the enemy, however dark the night, however sudden and heavy the outbreaks of musketry along the line, each man knew that his neighbor would stay at his post.

IN BATTLE.

When we compare the volunteers with the soldiers of standing armies in battle, we are again led to read what has been said on the subject by foreign military writers.

The Comte de Paris credits our men with a great deal of personal bravery and with skill in firing, but remarks that these qualities are not sufficient to impart to a body of troops "that collective courage, which inspires every man with the same spirit, and enables it to undertake with unanimity of purpose" what would be impossible for the individual; and he adds: "This distinctive trait of well-trained armies, which constitutes their superiority, is the result of long habits of discipline and the influence of old and experienced *cadres*." He also says that it took our volunteers "a long time to learn that upon ground where the fighting had to be done at short distances, it is almost always less dangerous to rush upon the enemy than to be decimated by his fire while standing still." He dwells upon these and other defects of the volunteers, he says, "because they were the causes of the first reverses," and because to expose them exalts their merit in accomplishing their great task by perseverance and devotion; and he pays them the high compliment of saying "that they went under fire more resolutely the second time than the first."

In an article published in the *Revue des Deux Mondes* for October 15, 1863, attributed by Mr. Hurlburt, the translator, to the Prince de Joinville, the following account was given of our volunteers in battle:

"The habits created by universal suffrage also play their part and are reproduced on the field of battle. By a tacit agreement the regiment marches against the enemy, advances under fire and begins to deliver its volleys; the men are brave, very brave; they are killed and wounded in great numbers, and then, when by a tacit agreement they think they have done enough for military honor, they all march off together. The colonel, perhaps, attempts to give a direction, an impulse, but generally his efforts are in vain. As to the officers, they never think of it. Why should they attempt it, and why should they be obeyed, if the majority of the regiment has made up its mind to retreat? Obedience in such an army is like the obedience which children playing at soldiers render to him among their comrades whom they have made their captain." This was written of the Army of the Potomac after it

had fought the series of well-contested battles on the Peninsula. It surely does not well portray the regiments which composed that army. In reading further, it is difficult to avoid the belief that the distinguished author is looking for the causes which led to the profitless result of that campaign, and that, unable from his friendly point of view to find them in the commander of the army, he lays them at the soldier's door by a generalization drawn apparently from a single incident. He says that when the Confederates made the final attack upon Porter's left in the evening at Gaines' Mill, it gave way, and that at last the disorder reached the centre, and then, to use the words of the translation," there is no panic, the men do not fly in the wild excitement of fear, but deaf to every appeal they march off deliberately, their muskets at the shoulder, like people who have had enough of it and do not believe success possible. In vain do the generals, the officers of the staff, among them the Comte de Paris and Duc de Chartres, ride sword in hand into the *mêlée* to stop their disorderly movement, the battle of Gaines' Mill is lost." No other account of this battle that the writer has seen mentions this extraordinary march off the field. But, supposing it to have occured, it is but one instance of such misconduct, and to generalize from it as is done in the passage quoted is worse than dangerous,—it is reckless. The student of military history will search in vain for evidence that such were the habits of the American volunteers in battle.

General de Chanal has written of their conduct in battle as follows: "It is difficult to compare the American soldier with any of the soldiers of the old continent. He has the merits of some, and faults the most opposite of others. Untiring on the march, resigned amid the greatest sufferings, he attacks resolutely but coldly. The combat, which for him is sustained neither by the sharp peals of trumpet nor by the rythmic roll of drum, has something of the sombre and the sinister. If he believes his efforts useless, he halts; neither orders nor exhortations can make him go forward. Once engaged, he is tenacious even to obstinacy, even to disobedience; he neither wishes nor knows how to retreat; and thousands of men perish, although an order to retreat executed with docility would have limited the sacrifice to some hundreds. In the long files of ambulances which bear from the field of battle the wounded, all bleeding, whom not even a dressing has relieved, one hears neither complaints nor groans. His death is always stoical. He will ask of you a little water, or to

place him in an easier position, and he waits patiently." He adds: "And, notwithstanding so cold in appearance, he is susceptible of *entrainement*," (which we can translate "impulse" or "enthusiasm") and he tells two anecdotes to illustrate this. In one, General Humphreys' troops, reluctant to go forward, are impelled to do so by the sight of the general and his son marching with slow steps towards the enemy. In the other, General Meade breaks his sword upon the heads of his retreating soldiers, and afterwards is presented by them with a new sword inscribed with the date and place of this occurrence. One cannot but feel grateful to this French general for his kindly appreciation of the merits of our volunteers, if somewhat idealized, but we must at the same time protest that he too has been led into erroneous generalizations upon their habits in the matter of obedience to orders.

We could not ask for more direct testimony than his to contradict the assertion that it was the wont of our men to march off the field against orders, for he says they neither wished nor knew how to retreat; but we are obliged to qualify this testimony to their courage, for they would obey the order to retreat. In this he may have been misled by the habit our armies had of refusing to give ground after a repulse. This was usually due to the policy of commanding officers and not the result of obstinacy in the men.

Colonel Chesney in the preface to his book of military essays on military biography says: "There is a disposition to regard the American generals and the troops they led as altogether inferior to regular soldiers. This prejudice was born of the blunders and want of coherence exhibited by undisciplined volunteers at the outset—faults amply atoned for by the stubborn courage displayed on both sides throughout the rest of the struggle; while, if a man's claims to be regarded as a veteran are to be measured by the amount of actual fighting he has gone through, the most seasoned soldiers of Europe are but as conscripts compared with the survivors of that conflict. The conditions of war on a grand scale were illustrated to the full, as much in the contest in America as in those more recently waged on the Continent. In all that relates to the art of feeding and supplying an army in the field, the Americans displayed quite as much ability as any continental power; while, if the organization and discipline of their improvised troops were inferior, the actual fighting was in fact more stubborn, for no European

forces have experienced the amount of resistance in combat which North and South opposed to each other. Neither was the frequently indecisive result of the great battles fought in America any proof that they formed exceptions to the ordinary rules of military science. These actions were so inconclusive, first, from deficiency in cavalry, and next because the beaten side would not break up. The American soldiery, in thus refusing to yield to panic when losing the day, retiring in good order, and keeping a good front to the victorious enemy, displayed, let us venture to believe, an inherited quality. In order to pursue there must be some one to run away, and, to the credit of the Americans, the ordinary conditions of European warfare in this respect were usually absent from the great battles fought across the Atlantic."

It is true, as said by De Chanal, that neither trumpet nor drum was used to incite our men to combat. Martial music would have stirred the hearts of our men in battle as well as the soldiers of other nations, but it seemed as if the musicians were left to care for the wounded by a common impulse among commanding officers. They did not think it needful to expose the lives of non-combatants merely to render battle more cheerful. There was no call to so quicken the courage of men who already had the will to do their duty. Perhaps the fear of being thought to "protest too much," deterred commanders from marching to the encounter with "strenuous trump and drum." Perhaps for the same reason speeches to inflame the ardor of the soldiers as they went into battle were not in vogue. No one, however, who knew the American volunteer intimately would suppose that there was anything so gloomy in his character as to make martial music unwelcome to him at any time.

To De Chanal's examples of enthusiasm or impulse in our soldiers we may add another more noteworthy. It was the facing about of the fugitives to follow Sheridan to the front on his famous ride from Winchester. The general in his report says: "The whole army had been driven back in confusion to a point about one and a half miles north of Middletown, a very large portion of the infantry not even preserving a company organization," and that ten miles to the rear "the head of the fugitives appeared in sight, trains and men coming to the rear with appalling rapidity." He stretched a line across the country to stop the stragglers, and he modestly says: "I am happy to say that hundreds of the men, who on reflection found they had not done

themselves justice, came back with cheers." The account of an eye-witness has been read before this Society by Colonel Crowninshield which confirms this with detail. He says that he encountered a steady stream of fugitives going to the rear, officers and men, whom his efforts were unavailing to stop, and that leaving them, he passed to another part of the field, and returning after some time found the stream of men going towards the front. The only reason for this was that Sheridan had passed up on the way to the front. He formed the line of battle at noon. The enemy renewed their attack and were repulsed. The fugitives returning to their corps, rapidly replenished them. At 4 o'clock he ordered the advance and then routed the enemy and ended the campaign. Giving General Wright what credit is claimed for him for the firm array and orderly retreat of the 6th Corps and a part of the 19th, and for resolving to contest the field after the rout of the rest, yet this was a veritable instance of turning a great defeat into a greater victory through the enthusiasm excited by one man and his boundless courage and activity and superlative military skill.

Our men started at the beginning of the war with the desire to find a Napoleon to lead them, and, with the national confidence in their destiny, they took it to be a matter of course that he would appear. The soldiers of the Army of the Potomac fondly believed they had found him in McClellan. His handsome face, soldierly carriage and winning manners confirmed the desire—excited by his supposed victories in West Virginia—to raise him to the ideal rank. He was cheered heartily wherever he appeared. Cheers rolled along the lines in front of Richmond at the news of the projected march to the James, because it was said to be for the purpose of flanking the enemy and entering Richmond. The rank and file could not know why that magnificent army lost 40,000 men only to intrench at Harrison's Landing at the end of the campaign. They still worshipped him. Cheers again were given for him when he took command in Maryland. Then Burnside, handsomer still, more affable even than McClellan, was cheered. When Hooker's proclamation of triumph was read to the Army on the west bank of the Rappahannock, he was cheered. Cheers even went up from the ranks at Chancellorsville, when the shells from Jackson's cannon could be traced through the air by their fiery trails in the twilight, because for a while it was thought they were from Stoneman's guns. But there

was the end of crowning the commander of the Army with laurel before he had won victory. The thinking bayonets had come to believe that cheers ought not to be given on trust. Thenceforward war was looked upon as a business in which a debit and credit account was to be kept. The men became used to weighing their officers in the balance, and neither pomp nor swagger nor display could hide from them weakness in the field, if such there was. At Antietam a hard fighting old division general, advancing sword in hand on the line of one of his brigades under the fierce fire at the sunken road, when within a few yards of the enemy, cried out with a great voice asking where the general of the brigade was, he was answered by shouts from the ranks: "Behind the haystack." These ruthless soldiers had spied the brigadier in this shelter as they rushed by to engage the enemy.

It is true, however, that the American soldier was not in general a creature of impulse, and it was needless to arouse his ardor in the name of glory or with martial music. He did not fight for glory; he knew that war was "a damnable trade." Although his good name was dear to him, he did not fight for fame's sake. He had enlisted for the war with the purpose of keeping this Union whole, and for this he faced death, not gloomily, but sometimes seriously, sometimes cheerily, and often ardently. No finer instance of the calm resolution in the face of death, which was fixed in him by intelligent patriotism, was ever seen than that which was beheld at Mine Run, November 30, 1863. Six divisions were drawn up in line of battle for an assault. When General Warren rode down his line in the dawn of morning, he and all his troops saw unveiled, as light came on, a most formidable line of earthworks upon a crest a few hundred yards in front. Cannon pointed through embrasures and over the works at every available place. Generals were riding along the line as if preparing for the coming attack. Men were visible everywhere, and it was plain that a great force manned the works. The intervening ground was a slope bare of obstacles. The skirmishers of the two armies were at rest within a few yards of each other. Not a shot was fired; the skirmishers even seeming to regard it as useless and trivial in the face of the great conflict which seemed to impend. Groups of the enemy reclined at ease on the hither side of their works, looking at the array of troops preparing to assault. Their indifference seemed to speak of a confidence which pervaded the enemy, in the certainty of repul-

sing our attack. Our men knew that they were drawn up for the assault. They were veterans of many battles. Not a few of them had been present at the disaster of Fredericksburg a year before. Their experience taught them that every chance was with the enemy in the conflict which they foresaw. They had piled their knapsacks on the ground so as to be relieved of their burden in the charge, and in cool blood were pinning to the fronts of their blouses pieces of paper with their names written on them. They were naming their bodies for the grave-digger. These were soldiers whom it was a high privilege to serve with. Thanks to the unselfish spirit of General Warren he refused to sacrifice his men.

The writer cannot find the evidence to support the statement that it took our volunteers a long time to learn that, where fighting had to be done at short distances, it was less dangerous to rush on the enemy than to stand still under his fire. This was apparent to most of the rank and file at a very early day. Early in 1862 the volunteers showed their willingness to rush upon works for fighting at close quarters, if need be; as shown at Forts Henry and Donaldson, at Williamsburg, and even at the siege of Yorktown, that supreme illustration of the folly of fighting at long range, where General Smith's Vermonters forced the passage of Warwick Creek, waist deep in the water, and carried a part of the enemy's works by direct assault. The failure to follow this up and take Yorktown lies upon the commander of the Army. General Palfrey says: "A single order would then have been sufficient from General McClellan to follow up and establish the success gained in the surprise."

At Fredericksburg the volunteers made a succession of determined and desperate advances. These followed, one after the other, from morning till night. The troops that made them lost over 7000 killed and wounded. They did not fail from reluctance of the men to go forward. The trouble was that the long lines were exposed to a deadly fire for so long a distance that too many were shot down to allow the ranks to close up, and so many officers were killed and wounded that there were not enough left to direct the movements, if the lines could have been reformed. It has been well stated by a member of this Society in a late work on this battle that "by the time French and Hancock were within assaulting distance their columns were too much reduced for their work."

But the lines did not stop to deliver fire until their formation was destroyed by the enemy's fire. Their dead were found within twenty-five yards of the enemy's line.

The truth is that the conditions of warfare had become so much changed by the increased range and efficiency of modern arms, that the critic who attempts to judge of the conduct of our soldiers by the infrequency of fighting at close quarters as compared with former wars, is in great danger of misleading himself. The same remark applies to the most celebrated of modern wars since ours. In the battle of Gravelotte the village of Ste. Marie aux Chenes was taken by an attack on two sides, in which, on account of the want of cover and the long range of the French chassepots, the Jagers of the Saxon Guards had to advance in a line of skirmishers "in a series of rushes of about two hundred yards each, and throwing themselves flat on the ground to recommence their fire," and apparently they lay on the ground 200 yards from the French until the latter evacuated the village.

The village of St. Privât, which stood on a slope like a glacis about 3000 paces long, was surrounded by a wall consisting mainly of massive stone houses, and had been fortified by the French for a general support of their whole right wing at Gravelotte. Three brigades of the Prussian Guards, the best trained soldiers of the Prussian Army, 18,000 strong, attempted to carry this position by advancing up the slope about the same distance that our troops marched under fire at Fredericksburg. The historians from whom this account is taken (Borbstaedt and Dwyer), say that the commandant of the corps, on account of its great losses, gave orders to suspend the attack while his skirmishers were yet 400 paces from the summit occupied by the French, to await the arrival of the Saxons on the flank of the enemy, without which, it is said, "it was impossible to carry out the last decisive attack." The Prussian Guards in this battle lost eight thousand out of twenty-five to thirty thousand, or about 32 per cent. At Fredericksburg Hancock's Division of 5000 men lost 2169, or over 43 per cent. The greatest loss of any German battalion of 1000 men was less than 50 per cent. Eight of Hancock's regiments, numbering in all 2548, lost 1324, an average of nearly 52 per cent.

On the 3d of May, 1863, the 2d Division of the 6th Corps, under Sedgwick, carried the old position at Fredericksburg by an assault impetuous enough to please the most exacting military

critic. The difference in result in the two battles of Fredericksburg seems to have been due to the enemy's force being much the strongest in the first battle, and to the fact that in the last battle the assaulting forces were not broken by the passage of the canal and had a much less distance to pass over under fire. Notwithstanding these differences, the assault of May was a very gallant one, and proves the willingness of our men to rush on the enemy. The fact is that the day had passed, before our war, when any attacking force could afford to throw away its chance of firing to rush upon a line which was not protected by defensive works, whatever might have been the best tactics in the days of flint-locks. To attempt to rush upon a line of troops of good *morale*, armed with modern weapons, in the open and over a long distance, is to court destruction. Pickett's charge at Gettysburg showed this.

The willingness of our men to engage and receive the enemy at reasonably close range may be perceived when we compare their habit in this respect with that of the contestants in the Franco-German War of 1870. At Saarbrucken-Forbach General Frossard made, as we read in Dwyer's account: "three great frontal attacks against the Prussian position, advancing in regular lines, commencing the chassepot fire at 1500 paces and keeping it up to within 1000 paces. * * * But each of these attacks was defeated by the incomparable steadiness and bravery of the Prussian infantry and artillery and the wonderfully precise fire of the flanking batteries." To praise troops for standing under infantry fire at 1000 paces would seem to imply a pretty low standard, if we did not know that the German soldiers were brave and steadfast. One who finds his standard in the battles in Virginia of twenty years ago, may perhaps be misled by failing to allow for the greater power of the arms of 1870; but, although the trajectory of the chassepot is much lower than that of the Springfield or Enfield rifle of 1861 yet its point blank range does not exceed 300 yards much, if at all. That of the Springfield and Enfield was about 200 yards. In our war it was rare for the line of battle to open fire until the enemy were within point blank range, notwithstanding the arms were usually muzzle-loaders. An officer, who should have allowed his men to open fire at three times, not to say five times, that range, would have been looked upon as light-headed.

The writer has it on good authority that among the officers

of our Army to-day fire would be deemed wasted with the best small arms at a range of over 500 yards.

Amid the great difficulties about one who tries to test the conduct of the soldiers of one country by that of the soldiers of another,—fighting with different arms, in different countries and against different foes,—perhaps the most satisfactory comparison is to be found in the ratio of killed and wounded in a series of battles, for in the long run it is the number killed and wounded which most tries the manhood and soldiership of an army. To this end the following table is set down, leaving out the missing where there is any reason to believe that they were taken prisoners, and dealing with round numbers:

FRANCO-GERMAN WAR.

Battle.	No. of Germans engaged.	Killed and wounded.	Per Cent.
Wörth	90,000	8,000	8.89
Vionville	80,000	16,500	20.62
Gravelotte	146,000	20,000	13.70
Sedan	120,000	10,000	8.33
Total	436,000	54,500	12.50

WAR OF THE REBELLION.

Battle.	Union Forces engaged.	Killed and wounded.	Per Cent.
Fair Oaks	60,000	5,000	8.33
Fredericksburg	80,000	12,358	15.45
Shiloh	61,000	9,000	14.75
Antietam	87,000	12,000	13.79
Chancellorsville	120,000	17,000	14.17
Stone River	43,400	8,798	20.27
Chickamauga	55,000	11,000	20.00
Gettysburg	82,000	16,534	20.16
Wilderness	100,000	15,000	15.00
Cold Harbor	100,000	13,000	13.00
Total	788,400	119,690	15.18

Two traits stood out before all the rest in the conduct of the Northern volunteers in battle. They were steadfastness and tenacity. They have not been more prominent in any other soldiers of modern times. Their steadfastness was shown times without number in the many battles which took place in the forests. The general, unable to sweep the field with his glass and detect the movements of the enemy against him, had to

depend upon the ranks to stay where he placed them when the encounter came, until the din of arms could guide him to the point which needed reinforcement. The men in their turn had to meet an unseen foe and fight the battle upon the faith that their flanks were covered and that they should not be left unaided when aid should be needed. This steadfastness was the trait which held the men in their places against panic. No surprise, no flight of any part of the Army, ever brought about a general rout. At White Oak Swamp in 1862 some twenty thousand men lay massed upon a plain which bordered the swamp. Many had thrown themselves down to sleep after the fatigues of a night march just as they had filed up from the crossing of the swamp, and many, if not all, lay without regard to the order of battle. The plain was filled with them. The fiery Jackson, fresh from the victorious field of Gaines' Mill, came suddenly to the opposite border of the swamp, and without warning from the skirmishers, all at once opened the fire of several batteries upon the thousands lying on the plain. The troops sprang into the ranks, and were marched and counter-marched, and wheeled and filed into line of battle, all the time under a very deadly fire of shot and shell, the confusion being augmented by the wild flight of pontoon and baggage teams through the columns. Yet the lines took their places with great regularity, and Jackson found his attempt to force the passage opposed by so perfect an array as to stop him completely, although he was, as he says in his report, "eager to press forward."

At Chancellorsville the rout of the 11th Corps did not disturb any other part of the Army, although many of the fugitives ran through the ranks of the other corps; and Birney's Division advanced right in the gap left by the beaten corps with the firmest front, although darkness was on them and the enemy could not be seen until they were close at hand, and then with a regular and thundering roll of musketry which lighted the whole field as if by a sheet of lightning, opened fire and drove back the enemy.

At Fisher's Hill the 6th and a part of the 19th Corps, undismayed by the utter rout of the other half of the infantry, kept a good front and retreated in good order from position to position, holding the enemy in check for hours, until at length Sheridan arrived and ordered the advance. They and the cavalry then went forward and utterly routed the enemy although the day had been their own.

At the battle of Atlanta the divisions of Smith and Leggett repulsed the attack of Hardee from their rear by leaping over their own breastworks and fighting from the other side, and then Leggett's Division, indifferent as to the direction of the enemy, when Cheatham attacked from the original front, leaped back to the proper side and beat him back.

The tenacity of our men was displayed in almost every battle where earthworks were attacked. If the skill of the general, or his good fortune, had so ordered it that the enemy was weak, the works were carried regardless of their strength; as at the second Fredericksburg, Petersburg and Fort Fisher. If, on the contrary, the works were adequately manned, the direct assault usually failed or at most resulted in a mere lodgment. But in all these cases our men seized ground in advance and held it until ordered back, and kept up the engagement at close quarters; as at the first Fredericksburg, Port Hudson, Cold Harbor, and the many encounters in front of Richmond and Petersburg in 1864 and 1865.

In no battle in modern wars have soldiers shown more tenacity than that which held our soldiers up in the mighty struggle over the salient at Spottsylvania which lasted for twenty hours at such close quarters that the flags of the contending lines were often planted at the same time on the opposite sides of the earthworks.

The most of our great battles lasted two or three days. European armies have seldom fought the second day.

To look into the conduct of our soldiers fully, the many battles of our war ought to be analyzed and tabulated with reference to the causes which led to victory or defeat in each one. In this way the faults and merits of the men could in a degree be distinguished from the results due to strategy and tactics. There are many other inquiries which ought to be pursued with much greater minuteness than is possible in a mere essay. In truth, the writer of this has had it forced upon him in the course of his labor that the subject which he has taken is too large for an article like this. It demands deliberation and literary skill such as are adequate for the history of a people. These the writer cannot bring to it.

What is here written has been prompted by his friendship for the true men with whom he carried the musket twenty-five or more years ago.

It is hoped that it may be of some value as the testimony of an eye-witness.

FIELD EXERCISES AND THE NECESSITY FOR AN AUTHORIZED MANUAL OF FIELD DUTIES.

By BVT. MAJOR J. B. BABCOCK, U. S. ARMY.

Captain Fifth Cavalry.

IT is stated in the German official "Regulations for the training of troops for service in the field," that "the object of all peace manœuvres is to prepare officers and men for active service, and they must therefore be conducted with reference to the requirements of actual warfare. Only those formations and dispositions which can be represented in a manner resembling the reality should be employed. * * * In arranging and directing these manœuvres it must always be borne in mind that the principal object to be attained is to give as accurate a picture of war as possible."

Further it is stated that "the constant exercises of outpost duties affords one of the most favorable methods for arousing and developing the individual intelligence and resource of the soldier."

"Cavalry, on whom the duty of patrolling, etc., would principally devolve in time of war, should be especially instructed in everything relating to outposts."

In this spirit the great value of the minor tactical exercises is discovered, inasmuch as they can be made to represent the actual conditions which would prevail in the preliminary stages of the contact of hostile forces. On the contrary the representation of a field in the later stages of close attack, at once becomes unreal by the absence of those most important factors, death and wounds, thinning ranks and the varied effect of danger and excitement on different spirits. Loss of interest and care in the performance of the operation is the result. The reverse is true of exercises representing the first meeting at long range of hostile parties. It will be observed in the thoughtful manner and close attention of all officers engaged in such exercises, how real are the impressions produced upon them when forced to make rapid decisions in regard to the dispositions of their commands (however small),

based upon what information they have been able to gather of the distant enemy's strength and intentions. Such information might be entirely contained in the rapidly arriving dispatches from the scouts and small patrols, or conveyed to the eye by the deployment of the enemy's skirmish lines at long ranges, or the dust of his columns on the roads.

The writer has been greatly impressed with the value of such exercises, by observing how entirely true of actual warfare they are in certain stages and how readily they develop the power of making rapid and correct inferences. Again these exercises bring home to all in a way not likely to be forgotten, the great importance of every moment of time in the presence of a rapidly developing offensive.

Officers without war experience have been taught theoretically that the enemy advances with feelers out, that his strength lies farther back, and when they first touch upon him they sometimes fail to appreciate until they see it, the rapidity with which a vigorous opponent can develop his front and seize important points, and, failing to make rapid decisions, suddenly find themselves compromised. As an example, during the practical exercises of instruction at the U. S. Infantry and Cavalry School, a lieutenant commanding a platoon of light artillery had his guns covered before firing a shot, by infantry fire at long range from the deploying support of the enemy's advanced guard. Five minutes before he should have known from the movements of the hostile scouts and flankers appearing and retiring from high points of observation, just where to look for the reserve of the advance and that the moment had come to open fire and delay its deployment. We have also seen a force cut off and compromised by the failure of the officer in command to divine the enemy's intentions, being deceived by a strong show of patrols along his extended front and paying no attention to the reports sent in, that the dust of a column could be seen moving to a flank.

Further, these exercises afford instructive practice in reporting results and writing clear dispatches. It is an excellent plan to require written reports from all officers in command of the troops engaged, no matter how small the sub-divisions.

Officers without experience in practical field training will be surprised to find how much interest can be awakened even in the matter of posting the outposts. Selecting the line of observation,

suitable points of outlook for the videttes and sentries, the positions best adapted for the supports, etc., seems frequently to be a revelation to many in regard to duties which they had previously only understood theoretically.

In this case again to require written reports with hasty sketches of the positions, is probably the best way to ascertain whether the exercises have been profitable.

There can be no doubt that the field duties which precede and lead up to an engagement and also the dispositions by which security from surprise is obtained, can be practically illustrated and made highly interesting and instructive, especially by the manœuvres of separate bodies of troops acting against each other. Exercises in frontal attack and defense of position if undertaken by opposing forces, do not present a real picture for the reasons stated. Exactly in proportion to the loss of realistic conditions is the loss of grave interest in the operation and consequently of practical value. Of the real use in the training of troops of those exercises which do not degenerate into "sham fights," there can be no question.

Stimulated and steadied by the feeling that what they know and can see of the enemy, is exactly the information that would be obtainable if the distant groups in their front were really foes, the officers in command of troops engaged in reconnoissance and development of the enemy's front; or acting as advance guards meeting the enemy; or representing a long line of outposts threatened at various points, etc., are really anxious about their decisions and dispositions and highly interested in every movement of the enemy. What they learn under such conditions remains with them as the fruits of experience. All this is lost in the noise and smoke of imaginary fighting at the shorter ranges, and the boundary line between highly interesting exercises and laughable shams is likely to be passed.

Exercises in modern frontal attack formations should be drills simply, without reference to the general plan of field manœuvres and without an opposing force, excepting in the preliminary stages.

The troops are deployed at long distances from the points to be attacked, and their advance is a drill in the fine art of skirmishing over difficult ground, in fire discipline, and in taking advantage of natural cover.

The supports obtain practice in feeding the firing line, and

the reserves in rapid changes of formation from small column to line and the reverse, conforming to the cover obtainable.

In short, it is hoped that the new drill regulations will provide for this part of the work, namely, drills in attack and defense adapted to the terrain and the problem of pushing troops forward over the extensive zones of modern fire.

Assuming then that with the advent of the new drill regulations, the soldiers in garrison will no longer spend the whole time devoted to instruction in an attempt to become absolutely perfect in the manual of arms, and faultless in the machine-like steadiness of their company wheels, we may hope that their garrison training will prepare them at once to take an intelligent interest in their field duties.

FIELD INSTRUCTION, DEPARTMENT MISSOURI, 1889.

As an example of the possibility of arousing in the soldier earnest and well-sustained interest in carefully conducted field instruction, the operations of General Merritt's command in the Indian Territory, in 1889, may be cited, and a brief account of the object and result of the course of instruction will not be out of place here, although previously published elsewhere.

It will be observed by a study of the published reports as a marked feature of this experimental camp for field training, that the exercises proceeded as a connected and progressive military operation. The force consisted of fourteen companies of infantry, two batteries of light artillery, two regiments of cavalry and a troop of Indian scouts.

Chilocco Creek, in the Cherokee Strip, Indian Territory, was selected as the point of assembly. South of Chilocco the open character of the country unobstructed by fences, the undulations of the ground affording cover, the numerous parallel streams at intervals of five or six miles, offering natural lines of resistance and concentration, together with the presence of the Arkansas River skirting the eastern border, made the theatre of operations one admirably adapted for manœuvres of instruction.

At the outset a definite military situation was assumed and the forces present organized to conform thereto. To that end the infantry as one brigade of two battalions, occupied the line from Rock Spring to Spring Creek, the cavalry by regiments going into position right and left of the infantry, and the batteries representing the artillery of a division being held in rear of

the line east of Spring Creek. The camp was about two and one-half miles in length and represented a small brigade of infantry, with the divisional artillery, in a forward position covering the concentration of the infantry division and holding the line of the Chilocco. The cavalry, as a brigade temporarily attached to the infantry division, was engaged in extending by both flanks the line of observation along the Chilocco and feeling well out to the front. The existence of the two remaining brigades of the infantry division stationed within one march in rear was assumed, and the infantry division commander represented by the commanding general, had come forward and gone into camp in the immediate vicinity of the first brigade.

It had been decided by the Department Commander, that the assembly of the troops afforded an opportunity not to be neglected, to fix the attention of all in the most practical manner upon the changes in the formations for attack and defense made necessary by the increased range, rapidity of fire and accuracy of modern breech-loading arms.

With this view in the order publishing the proposed Course of Instruction, the two first days were set aside for drills, properly speaking, in such formations. A copy of a memorandum issued in the form of a Department Circular was furnished to every officer setting forth the principles established by the experience of recent foreign wars, and directing that the dispositions made should substantially conform thereto. The wisdom of the plan became at once apparent when it was noticed that officers and men alike evinced much interest in the novelty and practical character of the drills. To quote from the published report: "It was interesting to observe the intelligent appreciation on the part of the enlisted men, of the principles governing the novel dispositions and formations they were called upon to assume."

It will be remembered that the object in view in inviting attention in this paper to a successful example of field training, is to point out the possibility of arousing soldiers to a lively interest in the work of instruction.

It is therefore proper to say that so marked was the interest of the troops, in practical drills which really seemed to mean training for the battle-field, that a third day not contemplated in the order, was devoted to the practice.

The whole course of instruction had been divided into three weekly periods. The first period included the drills in open order

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Chilocco Indian Training School
Chilocco
Spring
Road
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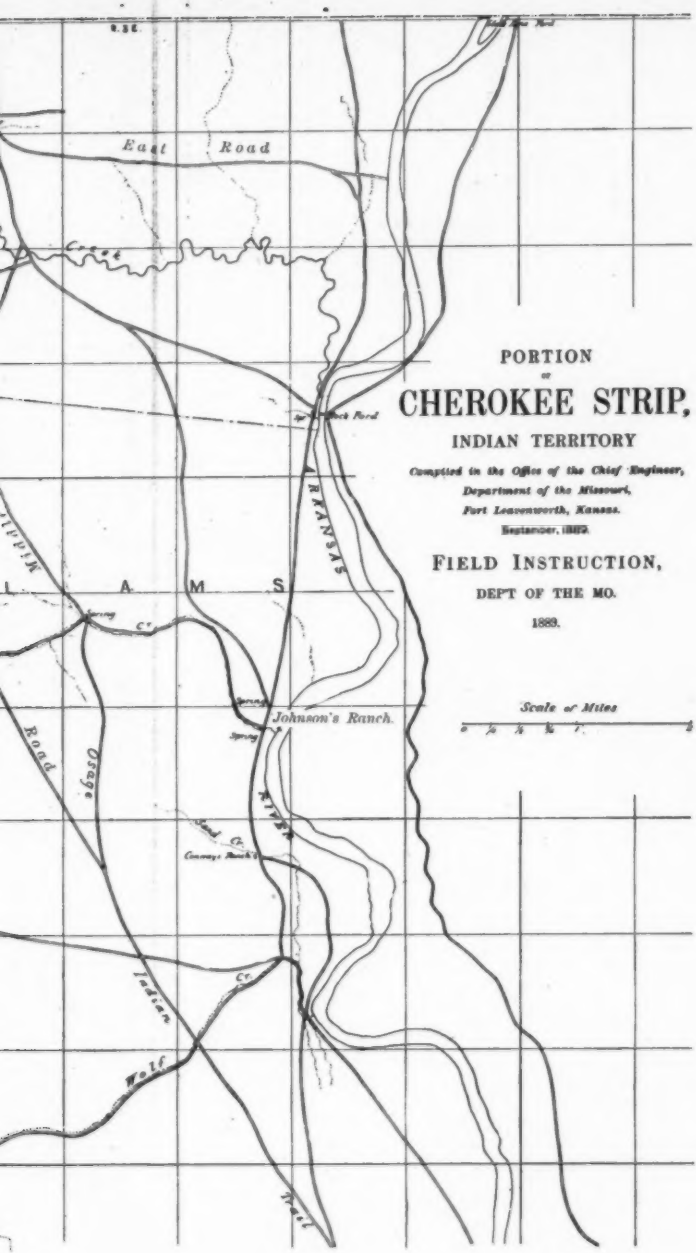

PORTION

OF

CHEROKEE STRIP,

INDIAN TERRITORY

Compiled in the Office of the Chief Engineer,
Department of the Missouri,
Fort Leavenworth, Kansas.
September, 1889.

FIELD INSTRUCTION,

DEPT OF THE MO.

1889.

Scale of Miles

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formations referred to, and also disposition for security and information of troops in camp. On the morning of the fourth day, therefore, outposts were established conforming to the actual strength and position of the command, patrols of varied strength and character were sent out, and reconnoissance of the country well to the front was made and sketches submitted.

From the close of the fourth day, the remaining exercises in the course of instruction proceeded as a connected operation set in motion by field dispatches from the assumed Division Headquarters. For the fifth day, practice was desired in the employment of the actual 1st Infantry Brigade, the cavalry and artillery, in covering with their outposts the concentration of the Infantry Division. Accordingly, late in the evening of the fourth day a field dispatch in the form of a note to the brigade commanders was sent out informing them that the 2d and 3d brigades would be up in the morning and would be held in rear of the right, and the 1st Infantry Brigade was instructed to push out its line of observation to the bend of the Chilocco, holding the main road west of Spring Creek with the reserve of the outpost and a battery of artillery. The cavalry on the left was directed to continue the infantry line along the Chilocco for one mile and a half, refusing the left at that point to cover the direct flank road to the Arkansas River. On the right the cavalry held the Chilocco for a long distance west of the railroad.

The report states that: "the line was taken up and dispositions made exactly as contemplated, and the Department Commander observed an earnest spirit and desire for instruction on the part of all officers and men."

To enhance the interest, confidential orders had been given for one troop of cavalry to make a detour to the south avoiding observation, and to appear as hostile patrols on the left flank of the outpost line. This was done and produced the desired effect of increased activity and interest along the whole front.

It had been provided in the plan for field instruction, that written reports should be sent in daily by all officers in command of troops however small the sub-division, and that all reports should be returned to brigade headquarters, at the end of each weekly period, to be read in public, together with the comments of the commanding general.

The result of this plan apparently demonstrated the fact, that nothing is more likely to facilitate instruction.

The second week had been designated for practice in dispositions for security and information of troops on the march.

This period was inaugurated by a connected operation which afforded practice for every battalion in the command, in advance and rear guard formations and in dispositions for the security of convoys and foraging parties.

The operation was set in motion by field dispatches to the brigade commanders, in substance, as follows:

They were informed that the division commander desired to collect all available supplies between the railroad and the river, as far south as Wolf Creek. Two foraging battalions of cavalry were sent to Wolf Creek, the one from the left along the river, the one from the right via the West road; all available wagons accompanied the foraging battalions. To cover the advanced battalions and trains the division commander directed a forward movement of the 1st Infantry Brigade to the line of Deer Creek, moving out by battalion on all available roads, covering their fronts with advanced guards and keeping up lateral communication by means of patrols. One battalion of infantry and battery of artillery was advanced to the crossing and held Rock Ford, and it was stated in the dispatches that the 2d and 3d brigades would hold and outpost the line of the Chilocco during the movement. The troops were informed that the supplies mentioned would be considered the dry firewood found in the creeks, and as the supply in camp was limited, the foraging parties were not without interest in the result of their efforts. On this day signal communication by flag and heliograph over a circuit probably twelve to fifteen miles in extent, was established between division headquarters on Deer Creek, the command at Rock Ford, the battalions on Wolf Creek, and the cavalry west of the railroad.

The widely extended command was withdrawn, and concentrated by the interchange of signal messages.

All the battalions fell back, each covered on its road by strong rear guards, and keeping up communication by patrols with the commands right and left.

The first operation of hostile contact took place the next day and was intended as an exercise for advance and rear guards. In order to carry out the idea of a connected and progressive military movement, the exercise was based upon the information of the enemy obtained by the foraging battalions, as shown by the following quotation from the dispatch to the cavalry brigade commander:

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"I am instructed to inform you, that in anticipation of a possible movement of the enemy on Rock Ford as indicated by his appearance there, etc."

The dispatch continuing directed the advance of the cavalry regiment from the left to Rock Ford to observe and hold the crossing, the first infantry brigade and one battery of artillery, to move in support to the junction of Johnson's Ranch and Rock Ford roads. One battalion from the cavalry on the right to the State Line Ford, and the remaining cavalry of the right and one battery of artillery to outpost Deer Creek from the Spring to Johnson's Ranch. To quote in substance from the report: "Numerous copies of the dispatches were sent out to be distributed to the battalion in order that the situation and plan might for purposes of instruction be perfectly understood throughout the command."

Confidential instructions, however, were issued to the cavalry brigade commander to disregard the dispatch so far as it related to the cavalry on the right, and instead to send the whole regiment from that flank, together with the battery of artillery ordered to report at 7.15 A. M. directly to Rock Ford, by roads south of Chilocco Creek and beyond the observation of the rest of the command.

At the Ford the troops were to be directed to put on brown fatigue coats and represent an enemy, and the regiment with the battery was to cross the river and return, throwing an advance guard forward and out on the Rock Ford road.

The high bank on the west side would conceal the hostile regiment from the observation of the scouts of the blue force approaching the ford as directed in the dispatch of the previous day. The report continues: "It was anticipated that in the hostile meeting on the Rock Ford road instructive practice would be afforded in the management of small forces in the preliminary stages of an action. It has been observed in these exercises that when the element of uncertainty exists in regard to the strength of the hostile forces encountered, as in this case, on the part of the blue commander the conditions up to a certain point are absolutely accurate. It would be difficult to overestimate the value of the practice thus afforded in making rapid inferences of the strength and intentions of the enemy.

"The result of the exercises on the day in question fully confirmed the anticipations. Practice of the character indicated is

greatly needed to develop in officers, especially those of the cavalry arm, proper appreciation of the importance of making rapid decisions in the presence of an enemy and to accustom them to grasp at once the military situation."

The operations of hostile contact were continued in the third week, and as in the first instance were connected and based upon what had transpired the day before in relation to the enemy. For example, a dispatch was sent to the cavalry brigade commander at 3 P. M., stating that the development that morning of a force of the enemy east of the Arkansas River made it very desirable to ascertain whether any change had taken place in his strength and dispositions in the immediate front, and the brigade commander was directed to send a regiment of cavalry to reconnoitre the enemy's position near Wolf Creek. The dispatch continues:

"The 2d and 3d Infantry brigades will move out of the lines on Chilocco, and occupy the high ground this side of Deer Creek in support of the reconnoissance. The 1st Infantry Brigade will occupy Rock Ford during the movement. Direct the cavalry on the left to watch the line of the Arkansas from Rock Ford to State Line Ford. A battery of artillery will report to you at 9 A. M. to accompany the regiment sent to Wolf Creek." * * *

The infantry brigade commander received the same information in regard to the object in view, and was instructed that to protect the left flank of the reconnoissance he would advance his brigade to Rock Ford and hold that crossing.

The above dispatches were made known to the whole command, but the report states that, "as before confidential instructions were given to one side, in this instance to the Infantry Brigade commander, apprising him of the intention that his command should represent the enemy.

"To this end he was directed to move out on the Rock Ford road as contemplated in the dispatches, until beyond observation from the camp and then to make a detour and gain the east road near its junction with the north and south road along the river. From this point his command would move west, simulating an attack from the upper State Line Ford on the Chilocco position. It was intended that the exercise of this day should afford practice in the conduct of a small force checking a superior enemy. It will be observed that the hour for the movement on Wolf Creek to begin, was not indicated in the dispatches, consequently although the battery for service with the cavalry had moved to

the right of the line at 9 A. M. and reported to the C. O. 7th Cavalry, the horses of that regiment were unsaddled; the men were all in camp, however, in anticipation of the march to Wolf Creek. Ostensibly the delay in moving south was accounted for by the fact that the 5th Cavalry on the left had sent one battalion on the east road to observe the Arkansas River above Rock Ford, and it was apparent that the result of such reconnoissance to the left rear should be known before the troops moved out to observe the enemy's position near Wolf Creek. The remainder of the 5th Cavalry was still in camp at 10 A. M., the horses unsaddled.

"At 10 o'clock the division commander and cavalry brigade commander rode over to the left of the line. In a few minutes after their arrival on high ground in rear of the 5th Cavalry, firing was heard well out on the east road in the direction of the river. Almost immediately thereafter a dispatch was received, sent by heliograph from the reconnoitring battalion on the east road, reporting hostile infantry and artillery west of the river from State Line Ford.

"Boots and saddles were sounded at once and orders sent to the battery on the right to come over at a gallop.

"The battalions as fast as they could saddle up, were dispatched at a gallop in the direction of the firing to the left and rear. As showing the interest and zeal of the men, it is worth noting that the cavalry battalions formed line in six and one half minutes after the sounding of boots and saddles, and that the battery came over from the right flank to the point of attack about three and one half miles and opened fire in seventeen minutes, including a short halt made by direction of the brigade commander.

"The division commander rode forward with the first troops saddled up, and about two and one half miles from the line on Chilocco, discovered the reconnoitring battalion dismounted and holding the crest of a hill commanding the road to the rear. In the distance the hostile infantry column could be seen deploying to re-inforce its advanced guard and carry the position. The hostile battery had already opened fire, probably 2500 yards away."

It was an admirable field for the exercise and looked in every way like the preliminary stage of an action. "The folds of the open hill country fell away gently to the eastward in the direction of the river valley, affording no obstacle to advancing infantry while concealing their dispositions.

"Preceded by the cavalry brigade commander, the cavalry battalions at a gallop began to arrive to the aid of the advanced troops. Forming line as they came up, some dismounting and pushing up the hill at double time, to prolong the fighting line, and others moving to the flank under cover of the rolling ground, to gain positions from which mounted attacks could be delivered, they made a vivid picture of a real affair highly instructive to all engaged.

"The earnest interest displayed by officers of all grades and the enlisted men engaged in the affair, confirms in the most emphatic manner the great benefit to be derived from practical exercises, provided it be clearly understood that the value is in the practice they afford in taking up positions, and divining the intentions of an enemy, etc. If the lines are allowed to approach each other closely and fire at will, the exercises degenerate into 'sham battles' and the interest ceases at once." It is believed that this outline of the story of a successful experimental camp for the field training of a small force fully supports the assertion, that earnest interest in the work of instruction can be aroused in troops by practical exercises in minor tactics, and that by them the soldier is taught that he is intended for other uses than mere show and garrison drills. It might be well to add that in the intelligent and lively interest in their military duties, which, as has been shown, can be aroused in all soldiers worthy of the name, by well conducted field instruction, would be found a remedy for the complaint that the soldier seeks in dissipation and finally in desertion, relief from the "grind" of monotonous duties.

Field exercises can be made to illustrate an endless variety of situations and properly managed cannot fail, with interest in the matter taught as a potent factor, to make better soldiers of short-term men than can be produced by longer terms of service passed in the dreary round of garrison duties.

The value of this fact appears to the writer to be loaded with possibilities affecting the future of the regular establishment and the military training of the young men of the country.

The wise policy of abandoning small posts to collect the troops, in larger bodies, into well built barracks and at places where every reasonable need of young soldiers can be supplied; together with the care taken by the present administration, that desertions shall not be traced to rights denied, or oppression in any form on the part of the military authorities; all tends to hasten the time when

the Regular Army will take its place in the popular estimation, as a practical training school for future volunteer officers.

It will be well for the Army and for the national guard, if the time ever comes, when the Government of the United States can make a special appeal to that class of young countrymen who would never think of becoming professional soldiers. If it could say to them, enter into the Regular Army for two years, and you will receive a practical military training, many young men of steady habits and good prospects, would be induced to spare the time for the sake of future usefulness as officers of State forces. It could be easily provided that if they made good use of their short term of service and passed satisfactory examinations at its close, they should receive from the War Department certificates of their ability to train volunteer companies in the field duties of war.

Then indeed the relations of the enlisted men of the Regular Army to their countrymen at large would change instantly, and the feeling that the uniform of the private soldier is a badge of surrendered liberties, would give place to universal respect for the young men in training to become military instructors, in the event that the nation should ever again be called to arms.

NECESSITY FOR AN AUTHORIZED MANUAL OF FIELD DUTIES.

It has recently become somewhat the fashion to underrate the value of the military knowledge obtained by our small Army as the result of its experience, since the great war, in the campaigns of the frontier. An examination of the fruits of this experience should teach us, however, that we have in reality educated in a very high degree, a majority of our officers in those field duties by which the efficiency of a body of troops is maintained. The writer ventures the assertion, that in our cavalry corps could be found a very high proportion of officers, who may be considered masters of the art of marching cavalry under all conditions of service and the care of man and horse in the field.

This knowledge of field duties, pertaining to the camp and the march, is doubtless true of the other corps of the line.

If this statement of the value of our experience needs support for the benefit of the skeptical, it is suggested that an attempt be made to realize the number, in thousands, of the miles marched and the hours passed under canvas, or in bivouac without shelter, by the troops that, since the war, have been en-

gaged in an almost incessant series of campaigns within the area bounded by the Missouri River, the Pacific coast and the British and Mexican frontiers.

If it be true then that our officers possess extensive practical knowledge of marching, camping, field cooking, and care of men and animals in campaign under all the varying conditions of climate to be found in our vast territory, the value of the fact to any practical scheme for field training, is found in the supply of experienced instructors at once available for preliminary post instruction.

This brings us to the first step to be taken in the preparation of a systematic course of instruction in field training, namely, the preservation in print of the fruits of our own experience.

By this is meant that competent officers should be detailed to prepare at once for the approval of proper authority, a manual of field duties for the U. S. Army. This work should contain not the "cut and dried" rules numbered as paragraphs of the regulations, which have heretofore been our authority for field instruction, but chapters on the various field duties, conforming to our national characteristics, military organization and war experience.

If, for example, the substance of the article on "Marching Cavalry," written by our most distinguished cavalry general now living and published in the first number of the *Cavalry Association Journal*, could be embodied by authority in our field regulations, the wisdom gained by hundreds of weary miles of actual marching would remain a permanent inheritance for future cavalry leaders.

The teaching should also be adapted to the peculiar conditions of warfare in this country, with respect to character of wagon roads, extensive sparsely settled areas affording facilities for cavalry raiding, and the like.

In the same way we need to recognize in a text-book of our own the fact now beginning to be acknowledged by some cavalry officers on the other side of the Atlantic, that in the self-supporting character of the troopers of Sheridan and Stuart may be found the prototype of the cavalryman of the future.

Again we may look in vain in any foreign text-book, for a full statement of the value of hasty entrenchments in defensive campaigns. The wonderful art of covering an army corps in one hour with practically unassailable works, has never been pre-

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served in authorized form for our instruction, although well-known to our armies at the close of the war.

Furthermore, the book should contain tables of information in regard to the carrying capacity of the various vehicles of rail and water transportation in use in this country, with brief statements of the best methods of embarking and debarking horses, artillery and wagons.

To sum up, we should have a manual of our own, regulating the field duties including the operation in minor tactics.

It should contain the lessons of experience of four years of desperate war, and a quarter of a century of Indian campaigning, as well as what we can assimilate to our organization and conditions, from foreign text-books on the art of troop-leading based upon the experiences of more recent wars.

This book, in the part devoted to minor tactics, should be free from much of the elaborate detail, which would not stand the rough handling of war, found in recent books on the subject, by European officers.

It would be difficult to improve upon the plan of some of them, however, whereby full and clear explanations of principles are followed by progressive exercises in handling detachments in the presence of an active opponent, leading up to combats of the combined arms.

With such a book in the hands of our officers, and in use as a text-book at the schools of application, and with the issue of the new drill regulations recognizing the changes due to the use of breech-loading arms, it would be possible to prepare a systematic yearly course of practical field instruction for the Regular Army.

Such a course would, of its own merit, attract to the Army a much better class of young men than are at present obtainable, and would eventually, by making the Army and its value as a training school better known, secure for it the firm friendship of all law-abiding citizens.

ARTILLERY SERVICE IN THE WAR OF THE REBELLION.

By BVT. BRIG.-GENERAL J. C. TIDBALL, U. S. A.

(*Continued from* JOURNAL, *No. 52.*)

II.

THE preceding paper closed at that point of time when McClellan had reoccupied Malvern Hill preparatory to a movement he proposed to make against Richmond from Harrison's Landing on the James River.

At about this time Lee detached Jackson on a campaign against Pope, who, with an army of about 45,000 men, had commenced a movement on Richmond by the direct route from Washington. Pope's army, called the "Army of Virginia," was made up of the troops that had been operating separately under Frémont, Banks and McDowell, in the Shenandoah Valley and along the Rappahannock. Pope had been called from the West to command it, and in the early part of August began to concentrate on the Rappahannock preparatory to his advance. Here, about the 6th of August, he was joined by Burnside from North Carolina with about 10,000 men. The Army of the Potomac was also to be united to it as soon as it could be withdrawn from the Peninsula.

Burnside had no artillery, and the deficiency was supplied with all dispatch from the Army of the Potomac. The rapidity of Jackson's movements, and the blows that he was giving Pope, called for the presence of the Army of the Potomac without delay, and its transfer down the Peninsula and up the Chesapeake was made as expeditiously as possible. In the meanwhile Lee had joined Jackson with Longstreet's Corps. This campaign, called the second Bull Run campaign, proved highly disastrous to the Union cause, and by the 3d of September Pope's entire force, including the Army of the Potomac, had taken refuge under the guns of the defenses of Washington.

Although this campaign was one in which there were some heavy battles and much desultory fighting, the general character

of it was such as to afford but few lessons as to either the proper or improper use of artillery; therefore this period will be passed over and the thread of the narrative resumed with the opening of the Antietam campaign, which commenced immediately after the close of Pope's campaign.

Lee, in order to profit by a state of affairs in every way desirable to the Confederate cause, and not to permit the season for active operations to pass without endeavoring to inflict further injury, projected a campaign north of the Potomac. By this, he says, he thought he might detain the Federal Army until the approach of winter should render another advance into Virginia difficult, if not impracticable. He furthermore thought that by entering Maryland he would encourage the secession feeling that already existed among many people of that State. He furthermore knew that such an invasion would arouse just fears for the safety of the capital and that efforts to secure that city would paralyze all other operations of the armies defending it.

Between the 4th and 7th of September, he crossed the Potomac at fords near Leesburg, and encamped in the vicinity of Frederick, Maryland. He hoped by this movement, so threatening to Washington and Baltimore, to induce, as he says, the Federal Army to follow him, after which he would fall back to western Maryland and, establishing his line of communication with Richmond back through the Shenandoah Valley, so manœuvre as to keep the Federal Army from re-entering Virginia. He had thought that his movement to Frederick would have led to the evacuation of Martinsburg and Harper's Ferry, thus opening his line of communication through the valley. This not having resulted, it became necessary for him to detach Jackson with a part of his corps to Martinsburg, and, after securing that place, sweep down the south side of the Potomac to the rear of Harper's Ferry. At the same time he detached McLaws' Division of Longstreet's Corps to attack the Federal position on Maryland Heights, directly opposite and commanding the heights of Harper's Ferry. After reducing the latter place, Jackson and McLaws were to rejoin him at Boonsboro or Hagerstown.

Harper's Ferry capitulated on the morning of September 15, before McClellan could reach it with a relieving force. By this capitulation the enemy secured 11,000 prisoners, together with 73 pieces of artillery, some of which were field guns, which he immediately incorporated into his batteries.

Jackson, leaving A. P. Hill to dispose of the prisoners and property, hastened with the remainder of his troops to rejoin Lee, who, having resisted the advance of the Federal Army at Turner's and Crampton's passes of the South Mountain, was now, September 15, taking position at Sharpsburg on the ridge between the Potomac and Antietam Creek, Longstreet on the right and D. H. Hill, whose division belonged to Jackson's Corps upon the left. Jackson, with Ewell's Division, arrived on the morning of the 16th, and, joining D. H. Hill on the left, took command of that wing.

As soon as it was discovered that Lee was crossing the Potomac, McClellan was restored to command, with instructions to use all the troops lately under Pope, for the purpose of driving him back into Virginia. McClellan lost no time in gathering together this demoralized mass and starting in search of the enemy, whose exact whereabouts was unknown to the War Department. The Army of Virginia was merged into the Army of the Potomac, thus passing out of existence after a career of less than two months. The numerical designations of corps in the Army of the Potomac, of which they had been deprived and which had been given to corps in Pope's army, were restored.

By September 7, McClellan had his corps well under way, heading in the direction of Frederick. As the march progressed, the process of reorganization went on. The troops were rapidly regaining confidence, and their former soldierly bearing and discipline were fast returning. In this respect there was not in the artillery so much change as in the infantry. The batteries, although suffering from the general depression of the late campaign under Pope, were still intact as units, and in good condition. The Artillery Reserve, that solid rock of dependence, had not been meddled with, and was still complete in its organization. After having absorbed Pope's Army of Virginia, the Army of the Potomac consisted of nine corps, namely,—the First, under Hooker; Second, under Sumner; Third, under Heintzelman; Fourth, under Keyes; Fifth, under Porter; Sixth, under Franklin; Ninth, under Burnside; Eleventh, under Sigel; and Twelfth, under Mansfield. Of these, the Third and Eleventh remained for the immediate protection of Washington, while all of the Fourth, except Couch's Division, was left at Yorktown to hold the Peninsula; so that McClellan's moving force consisted of but seven corps and one division of another. These

corps were necessarily small, numbering in reality, but little more than the divisions in the Confederate service. Divisions were, likewise, proportionally small. As a rule the artillery was attached to these small divisions, two or three batteries to each, except that in the First Corps they were attached to brigades, one to each brigade. As the brigades were very small, averaging only from twelve to fifteen hundred men in line, the margin left for efficient service of the batteries of this corps was reduced to a minimum, as was demonstrated in the battle soon to follow. In the Twelfth Corps the batteries were attached to neither divisions nor brigades, but were merely a group, nominally under the direction of the senior captain.

McClellan first encountered Lee at the passes of South Mountain, through which the latter was withdrawing from Frederick. After some severe fighting these passes were forced on the 14th, and during the succeeding night Lee fell back through Boonsboro and took position, as before stated, on the Sharpsburg ridge, between Antietam Creek and the Potomac. Early on the following morning the cavalry, under Pleasanton, and Tidball's horse battery, started in pursuit, coming upon the rear-guard of the enemy at Boonsboro. Here a spirited encounter took place with the cavalry of the enemy, resulting in a chase of several miles towards Hagerstown, and thence around to the front of Lee's position behind the Antietam. Here the horse battery, coming into position, caused the enemy to disclose the extent and nature of his line by the opening of a number of his batteries. Richardson's Division of Sumner's Corps soon made its appearance with its batteries, and during the afternoon a brisk artillery duel was maintained between the opposing forces.

The position taken up by Lee was one of great strength, being across a horseshoe bend of the Potomac, and along a ridge, which, while giving him the command of the ground in his immediate front, afforded protection to his troops, and a screen behind which he could manœuvre free from observation by his opponent. In his rear were two fords across the Potomac, securing to him means of communication with his base and his supply trains, already on the opposite side; they also enabled the troops not yet arrived from Harper's Ferry, to join him with facility. In front, and at a distance of about a mile from the crest occupied by him, runs the Antietam Creek, a sluggish stream, winding among hills, fordable at numerous places, but

with steep and rugged banks. Although it constituted something of an impediment all along, it was only at that part of it in front of Lee's right that it proved to be really an obstacle in his favor. This creek, flowing almost parallel to the ridge, empties into the Potomac a couple of miles below the horseshoe bend. About half a mile behind the centre of Lee's front stands the village of Sharpsburg, from which two turnpike roads diverge to the eastward; one to Boonsboro across the Antietam at what became known in connection with the battle as the "Centre Bridge"; the other, at Rohrersville, crosses the Antietam at a bridge about three-fourths of a mile below the former. These two bridges were under the enemy's fire, and figured among the events of the battle. A third bridge, about two miles above the centre bridge, afforded some facilities to McClellan in crossing his right wing. Owing to the hills on both sides of the creek, the roads across these bridges have a winding and tortuous course.

Another road, the main highway to Hagerstown, leaving Sharpsburg follows in a northerly direction the crest of the ridge upon which Lee had taken position; and on it, distant about a mile from the village, stands the Dunker church, a small white building, situated in an open grove of oak and other forest trees. Lee's left wing was originally some distance in front of this church, but when, during the battle of the following day—September 17th—it was forced back, this position became La Haye Sainte of the field. The road leading by this church may be considered the axis of the ground over which the attack of the right was made,—the most furious part of the battle of the day. There were numerous cross-roads and lanes leading in various directions to farm houses; but as the country, although hilly, was generally open and tilled land, affording freedom of movement to troops, these played no special part in the battle, with the exception of one, which, from washing and use, had become sunken, thus affording a sheltered position for the enemy, and which, from the slaughter that took place therein, is known as the "bloody lane."

Between Lee's crest and the Antietam are smaller ridges and undulations, affording McClellan good positions for his artillery and some little shelter for infantry. Along the east side of the creek extends a ridge, a portion of which, near the centre bridge, was occupied by batteries of the Reserve operating chiefly

against Jackson's left about the Dunker church. But Lee's position, which was eminently favorable for artillery, dominated more or less all these positions.

With the exception of a few rails and stones hastily thrown together by the rebel detachments defending the lower bridge, there were no intrenchments whatever upon either side; but some stone fences and outcropping ledges of rock in the vicinity of the Dunker church afforded good cover for Jackson's troops, and were liberally taken advantage of by them. Excepting the woods in which Jackson's left rested, and a few strips and clumps of trees here and there in other places, the battle-field was quite open and most of it visible from the ridges on the east side of the Antietam, on one of which McClellan had his headquarters.

The extreme left of Lee's army—Jackson's wing—rested on the upper end of the horseshoe bend of the river; from which point, following the crest of the ridge, somewhat convex towards the enemy, it extended a distance of about three miles and terminated on the hills to the south of Sharpsburg. At favorable points along this line the enemy had his batteries, and its shortness enable him rapidly to reinforce any point of it from another. The ground in front of it to the Antietam consisted of rolling hills, each commanded by those in rear.

Such, in brief, were the principal features of the battle-field of Antietam, which, considering the vital issues at stake, was one of the most important of the war.

Lee had present on the field two corps of nine divisions, comprising 40 brigades, of 185 regiments of infantry. McClellan had present six corps of 15 divisions, comprising 44 brigades of 186 regiments of infantry.

The former was slightly superior to the latter in cavalry, but as there was no opportunity for this arm on the field, it did not count on either side. The horse batteries of both sides were, however, actively engaged.

While the infantry of the two opposing armies was almost identical in point of numbers, McClellan was greatly superior in artillery. Lee had on the field 73 batteries of 288 guns; McClellan had 55 batteries of 322 guns—a difference in favor of the latter of 34 pieces. But this disparity was more than compensated for by Lee's superiority of organization, which was that of the battalion system. Each of his infantry divisions, which in strength were about double those of McClellan, had attached to

it a battalion of from four to seven batteries. These battalions were commanded by colonels or lieutenant-colonels, seldom by majors, and never by captains taken from their batteries. All of Jackson's 22 batteries were thus assigned, but of Longstreet's 29, eight constituted a battalion of reserve. In addition to all of which, Lee had a reserve of 22 batteries organized into four battalions, commanded by a brigadier-general. This system of organization and command enabled the batteries to be used when and where most needed.

McClellan's artillery, with the exception of the Artillery Reserve, had no higher organization whatever than the individual battery, and these were attached, as before stated, in Hooker's Corps to brigades, one battery to each brigade; in the other corps to divisions, without any commanders other than the individual battery commanders. In the entire army, outside of the Artillery Reserve, there was but one field officer of artillery—a major—on duty with the artillery. The consequence was that although all the batteries were engaged at some time or other during the battle, they were, as a rule, employed in such a desultory manner as greatly to weaken their effect as a whole. In only one or two instances were batteries massed so as to give decisive blows. The fact of their being tied down to the narrow limits of small infantry commands rendered their employment, other than in a scattered and feeble manner, impracticable. This was notably the case on the right, where the chief attack was on Jackson's left along the Hagerstown road.

The Artillery Reserve was organized into three battalions, with three field officers for the whole, one of whom—Major Arndt—was killed on the first day of the battle. Most of the batteries of the Reserve were, however, detached temporarily to supplement the batteries of the divisions, and even this, the only artillery organization worthy of the name, was thus, to a degree, emasculated.

During the 15th, all of McClellan's forces, except Franklin's Corps and Couch's odd division of the Fourth Corps, came up and temporarily occupied positions near the centre and lower bridges. Four of the long-range batteries of the Reserve were put in position on the crest of a ridge overlooking the Antietam to the right of the centre bridge, from which they had a good field of fire over the left of the enemy's position, particularly so upon Jackson's line towards the Dunker church, which they either enfiladed

or took in flank. Jackson and other commanders mention the damaging effect of this fire.

Early on the morning of the 16th the enemy opened a sharp fire of artillery on this position, which was soon silenced by the batteries just referred to. Major Arndt, commanding these batteries, was killed at this time.

The whole of the 16th was consumed in getting the troops into position and in getting up ammunition and supply trains. This delay enabled Lee to get up the troops that had been detached to reduce Harper's Ferry, and this neutralized about the only advantage McClellan had. About 2 P. M. Hooker, with the First Corps, crossed the Antietam at a ford and the upper bridge to attack, and, if possible, turn the left of the enemy. A sharp contest took place, resulting in Jackson's advance being driven from a strip of woods, several hundred yards to the rear. Here Hooker rested for the night, in readiness to make an early attack in the morning. In this affair several of Hooker's batteries took a spirited part, so much so as to call for special remark by Jackson as being very damaging to him. While this combat was going on, Hood's Division of Longstreet's Corps was sent from the right to reinforce Jackson, A. P. Hill's Division of his own corps having not yet arrived from Harper's Ferry. Hood took position with his left on the Hagerstown road. J. R. Jones' Division Jackson's old division) took position on Hood's left, while D. H. Hill's Division was on Hood's right, extending along towards the centre of Lee's line. J. R. Jones' left, resting near the bend of the river, was strengthened by "Jeb" Stuart's horse batteries. Stuart's cavalry was sheltered under the hills towards the river. During the night Ewell's Division of Jackson's Corps arrived and relieved Hood; but next morning, when Jackson was again hard pressed, he returned to his former position, and assisted Jackson throughout the battle.

Mansfield, commanding the Twelfth Corps, crossed the creek during the night and bivouacked about a mile in rear of Hooker. Sumner was ordered to hold his corps, the second, ready to cross early the next morning (the 17th) to support Hooker and Mansfield, who were to attack at an early hour. Porter's Corps, the fifth, was held to defend the centre bridge and support the batteries near it. Burnside's Corps, the ninth, was behind the ridges near the lower bridge. Franklin's Corps, the sixth, had not yet arrived from Pleasant Valley, where it had been sent with Couch's

Division to endeavor to save Harper's Ferry. Couch's Division was sent to re-occupy Maryland Heights and was therefore not present at the battle.

McClellan's plan for the impending general engagement was to attack the enemy's left with the corps of Hooker and Mansfield, supported by Sumner's, and, if necessary, by Franklin's; and as soon as matters looked favorable there, to move Burnside's Corps against the enemy's extreme right, upon the ridge south and in rear of Sharpsburg, and having carried this position, to press along the crest towards the left of the enemy; and whenever either of these flank movements should be successful, to advance the whole centre with all the forces there disposable. This was a very simple, and withal a reasonably good plan, but was but feebly executed. Its success involved one vital condition; that is, precision of coöperation, between the two wings, to prevent the enemy from concentrating first upon one and afterwards upon the other, a thing which actually did occur.

The attack on the right was really a succession of attacks, each made just after the preceding had failed; first by Hooker, then by Mansfield, each with a corps; then by Sumner with Sedgwick's Division, and finally by Irwin's Brigade of Franklin's Corps. Meanwhile Burnside did nothing on the left to prevent troops from being sent from Longstreet's wing to reinforce that of Jackson. Finally when, in the afternoon, Burnside did make his attack, the attack upon Jackson was not renewed to prevent him from sparing troops to reinforce Longstreet against Burnside. The attack of French's and Richardson's divisions of Sumner's Corps upon Lee's left centre was too late to serve as support to Hooker and Mansfield. The trouble upon this wing seems to have been the want of a commander actually present. Until the arrival of Sumner, which was not until after both Hooker and Mansfield had failed, Hooker was the senior officer; but he was fighting his own corps and gave no attention to Mansfield's until it came up to his assistance. In consequence of some delay in transmitting orders, Sumner did not start for the battle-field until an hour or more after the appointed time, and consequently was not present at the supreme moment to insure promptness and precision of coöperation.

Hooker was to commence the attack soon after daylight, striking directly for Jackson, whose left stood across the Hagerstown road about a mile in front of the Dunker church. On the

right of the road, extending to the bend of the river, the land was chiefly wooded; while on the left, strips of wood alternated with corn and other fields. Through the woods, parallel with Jackson's lines, limestone ledges cropped out, affording natural rifle-trenches for his troops. His right, composed of troops from Longstreet's corps together with D. H. Hill's division, extended off along the ridge, or rather in front of the main ridge, towards the Boonsboro road, which was the centre of Lee's position. Owing to the delay of Sumner's attack with French's and Richardson's divisions, Hill was enabled to strengthen Jackson with three of his brigades, which, together with the divisions of Ewell and T. R. Jones, gave him 57 regiments of his own corps alone, to say nothing of Hood's Division and other troops from Longstreet, against which Hooker had but 43 regiments. Jackson had between twenty and thirty batteries, containing more guns than he could find room for. Hooker had but nine batteries of 54 pieces, many more than he made good use of.

Notwithstanding this great disparity of force in favor of Jackson, Hooker at first drove him back, seeing which, Lee reinforced him from Longstreet's wing, which was then idle in consequence of Burnside's delay in making his attack. Hood's division of 14 regiments was first sent, soon followed by 31 regiments from Longstreet's other three divisions, making a grand total of 103 regiments that Jackson had in the fight around the Dunker church.

Mansfield brought up to the support of Hooker his two divisions of 22 regiments and 7 batteries, followed by Sedgwick's division of 13 regiments and two batteries, and, still later, by Irwin's Brigade of 5 regiments, in all 40 regiments and 9 batteries which, added to Hooker's corps, gave a grand total of 83 regiments and 18 batteries of Federal troops against the foregoing enumerated force of Jackson. By thus reinforcing Jackson, Lee had at this point of contact about twenty per cent. more troops than McClellan had, and when, later in the day, Burnside finally made his attack on Lee's right, the latter managed to have a still greater percentage against him at that point of contact. It will be remembered that the two armies were almost identical in infantry strength, and that McClellan's plan of battle contemplated a simultaneous attack upon both wings of the enemy. As they were not made simultaneously, Lee was enabled, by the shortness of his line, so to manœuvre as always to have a superior force at the point of actual contact.

At dawn of day on the 17th, the enemy opened the battle by a spirited fire from his numerous batteries, which was replied to by some of Hooker's batteries, and also by the batteries of long range guns on the ridge on the further side of the Antietam. As soon as possible Hooker advanced his lines over the fields and through the strips of wood heretofore mentioned, and soon came upon the enemy in position, extending across a large corn-field and into woods upon each side of it. To dislodge him from this field, Hooker says:

"Instructions were immediately given for the assemblage of all my spare batteries near at hand, of which I think there were five or six, to spring into battery on the right of the field, and to open with canister at once. In the time I am writing every stalk of corn in the north and greater part of this field was cut as closely as could have been done with a knife, and the slain lay in rows precisely as they had stood in the ranks a few moments before."

This somewhat iridescent description is sustained in substance by Confederate reports. Gradually, but by the most desperate fighting, the enemy were forced back about a mile, into the woods in which stands the Dunker church, around which occurred the fiercest conflicts of the day. The ground over which Hooker had driven Jackson, were the open field and bodies of wood interspersed with the limestone ledges before mentioned, as being so admirably adapted as natural rifle trenches. Over this ground the opposing forces literally tore each other to pieces. But Jackson's superiority of numbers soon told in his favor, and Hooker was driven back in disorder.

Jackson, who was not given to exaggeration or florid descriptions, in describing this conflict, says:

"Batteries were opened in front from the wood with shell and canister, and our troops became exposed for near an hour to a terrific storm of shell, canister and musketry. With heroic spirit our lines advanced to the conflict, and maintained their position in the face of superior numbers with stubborn resolution, sometimes driving the enemy before them and sometimes compelled to fall back before their well-sustained and destructive fire. The carnage on both sides was terrific."

While this was going on in Jackson's immediate front, the batteries of long-range rifles posted beyond the Antietam on the ridge near the centre bridge were active. Of these Jackson says:

"At the dawn of day skirmishing commenced in front, and in a short time the Federal batteries, so posted on the opposite side of the Antietam as to enfilade my line, opened a severe and damaging fire."

To silence these batteries Lee directed his chief of artillery to post his most powerful batteries along the crest in front of Sharpsburg; but before this could be effected the four horse batteries of Pleasanton's cavalry pushed across the centre bridge, and, amid a shower of shot, shell and musketry, took position on an intermediate crest between Lee's line and the batteries on the opposite side of the Antietam. The fire from the twenty-four pieces of these horse batteries was so spirited as not only to prevent the establishment of other batteries in their front, but to drive away those already there. In the course of a couple of hours, these batteries expended all their ammunition, and while absent for a short time replenishing their chests, the position was held by other batteries sent there from the Reserve temporarily for that purpose. The horse batteries continued to hold the position until withdrawn at dark. In addition to attending to their immediate front they, as occasion offered, directed their fire to the right upon Jackson's masses, and to the left upon the troops confronting Burnside.

As previously stated, Hooker's ten batteries were attached, one to each of his ten brigades, each brigade numbering about 1000 men actually in line. The ground over which Hooker was to advance, and did advance, was less than half a mile wide and was mostly covered with woods. As he had about 10,000 men in line it is readily seen that he had but little room left for batteries. Some of the batteries, however, managed to get in and did heroic service; but most of them were unable to follow their brigades, and were of but little real service in the action. The same thing obtained with the seven batteries of the Twelfth Corps, when the latter advanced under Mansfield over the same ground a little while afterwards.

Most of the batteries of these two corps were unemployed at the most critical period of the battle, and while the infantry to which they were attached was engaged in a life and death struggle in their front.

On the left of the ground then being fought over, between it and the Antietam, were knolls and secondary ridges, admirably adapted to artillery, and in such positions that batteries occupy

ing them could have taken Jackson in flank, enfiladed his lines, and disorganized his masses about the Dunker church. The advantages of these positions did not probably come under Hooker's own observation, and he had no chief of artillery to point them out to him. It was certainly not the province of his battery commanders, in fact, it would have been highly improper for them, to have left their commands to search the battle-field for positions for their batteries. Had the batteries been organized into brigades or battalions, the commanders of these could have thrown out to this position a dozen or so of batteries, the fire from which on Jackson's flank would probably have enabled Hooker not only to hold that which he at first gained, but to gain still more. But the system of tying down batteries to the narrow limits of small infantry commands did not admit of this freedom; consequently Jackson was unmolested on his flank by Hooker's batteries, many of which were in enforced idleness while his infantry was being beaten and driven back.

Hooker in his advance got as far as the edge of the woods in which stands the Dunker church, but no further. At the far side of this strip of timber, towards Jackson's left, is an eminence upon which Stuart posted his horse batteries and some other artillery. This proved of the greatest service to Jackson, as it gave the left of his line a firm point of rest, and enabled him to use his artillery upon any troops advancing beyond the Dunker church. In the same manner Hooker's batteries could have served him if they had been stationed a little to the left of the ground over which he was forging his way against Jackson.

Hooker had now been engaged about two hours, and the enemy had already commenced to force back his shattered brigades, when Mansfield came to his relief with the Twelfth Corps. This veteran officer was killed while examining the ground over which his corps was to advance, and the command devolved upon General Williams. This corps went into action with about 7000 men; to which was attached seven batteries, under one of the captains as chief of artillery. The batteries were not attached to either divisions or brigades, but were supposed to be directed by the corps commander through his chief of artillery. The facts were that the batteries received but little direction from any one. The infantry pushed forward into the woods to struggle with the enemy and was lost to view, while most of the batteries remained behind.

The Twelfth Corps, with some assistance from fragments of the First, forced the enemy back again to the Dunker church wood and partly beyond. Here the Union troops became exposed to Stuart's artillery and other batteries judiciously posted, and Jackson, having by this time been greatly reinforced from Longstreet's wing—making his numbers more than two to one of his opponents—the Twelfth Corps was in turn driven back.

About this period Hooker was wounded, and the command of his corps devolved upon Meade, one of his division commanders, who caused the batteries to assemble on some eminence slightly in rear, where their fire became useful in preventing the enemy from establishing batteries in the openings of the wood. They also formed points of rest for the assembling of the discomfited infantry.

At this time Sumner appeared upon the scene with Sedgwick's Division, and being senior officer on that part of the field, assumed command. It will be remembered that he had been ordered to cross the Antietam early in the morning with his entire corps, which he did, but owing to some delay in transmitting orders to him, he did not move to the attack until the morning was well advanced, and then did not reach the point of contact until about 8.30 A. M. Sedgwick marched his division straight to the front, which brought him to where the First and Twelfth Corps were engaged. French with his division was on the left of Sedgwick; but in moving forward a considerable interval occurred between these divisions, and the fight that French subsequently had was entirely distinct from that in which Sedgwick engaged. Richardson's Division was on the left of French, and from Richardson to Burnside, on the extreme left, was an interval of over a mile, occupied only by the four horse batteries before mentioned and a few companies of Sykes' regular infantry holding back the skirmishers of the enemy in the corn-field in front of these batteries.

The cavalry that had crossed the bridge in company with these batteries, finding itself greatly exposed and without power of acting, took shelter in hollows and under the banks of the creek. At this period of the war the cavalry had not yet fallen into the hands of those who knew the proper use to make of it.

Sedgwick marched his division, numbering about 5000 muskets, into battle over the same ground that had proved so disastrous to the corps of Hooker and Mansfield. He, however, got

farther than either of the former; so far, in fact, that his troops came under a flank fire from the batteries established by Stuart on the eminence before mentioned, and also a fire from the other direction; in other words, his division was exposed to the heaviest possible fire of both musketry and artillery upon not only its front, but both flanks, and partly in rear also. This doubled it up, causing portions of it to break and retire several hundred yards before being rallied. Meanwhile, however, it did some of the most stubborn fighting of the day, and lost heavily in killed and wounded.

Sedgwick himself was wounded, and the command of the division devolved upon Howard. Jackson, at this epoch, bringing forward heavy reinforcements, forced Sedgwick's Division, together with the remnants of the First and Twelfth Corps, back to within a thousand yards of the line occupied by the enemy when the battle commenced in the morning. In thus falling back the batteries in rear were unmasked, and their fire, together with that of the infantry, caused the enemy to stay his pursuit and take shelter in the woods and behind the ledges of outcropping rocks.

This repulse of the enemy gave opportunity for rearranging the lines, and reorganizing the commands, now in considerable confusion. The batteries became united more or less into groups, on ground suitable for their fire. Howard in his report, speaking of one of these groups, says: "The batteries opened fire, and checked several attempts of the enemy to establish batteries in front of our right, and to turn our right flank. About an hour before sundown the enemy succeeded in getting four pieces in position and opened fire upon us, somewhat enfilading my lines. General Sumner ordered me to change front, placing the infantry in rear of the batteries, while the batteries, in a semicircular order, brought a concentrated fire from twenty-six pieces upon the enemy's guns just established, and in less than ten minutes the enemy was driven back and did not appear again in that quarter."

General Doubleday, in his report, speaking of another group, says: "Thirty guns had been concentrated on the right flank of the general line of battle, and my division (First, of Hooker's Corps) was directed to join the remains of General Sumner's Corps as a support to these guns. General Sumner assumed command in person, and I was directed by General Meade to receive

the orders of General Sumner, to assume the command of these thirty guns in addition to the command of my division. About 5.30 P. M. the enemy massed his infantry and opened fire with his artillery to force our position, but my thirty guns replied with such vigor and effect that the column of attack melted away and the rebels gave up the attempt. After this we were not disturbed."

This was the flank movement alluded to by Jackson in his report, and of which he says:

"In the afternoon, in obedience to instructions from the commanding general, I moved to the left with a view of turning the Federal right, but I found his numerous artillery so judiciously established in their front and extending so near the Potomac, which here makes a remarkable bend, as to render it inexpedient to make the attempt." Jackson here mentions the judiciously posted artillery. If it had been as judiciously posted for assisting in the fight as for covering the retreat, the latter would not probably have occurred. The reasons why this did not obtain have already been stated. It seems that for want of artillery officers of proper rank to exercise command over the batteries, a division commander had to be assigned to the duty of collecting the batteries and placing them in position. It was not until the following year that these glaring defects of organization and command of artillery were corrected.

About the time of Sedgwick's repulse and the formation of the line just mentioned, that is, about noon, Franklin arrived from Pleasant Valley with the Sixth Corps, which he at once pushed forward to the support of, not only the sorely distressed right, but also the divisions of French and Richardson now pushing the enemy in their front. One brigade of the Sixth became heavily engaged. Of this McClellan says:

"Finding the enemy still advancing, the Third Brigade of Smith's Division, commanded by Colonel Irwin, 49th Pennsylvania Volunteers, was ordered up, and passing through Lieutenant Thomas' battery, charged upon the enemy and drove back the advance until abreast of the Dunker church. As the right of the brigade came opposite the woods it received a destructive fire, which checked the advance and threw the brigade somewhat into confusion. It formed again behind a rise of ground, in the open space in advance of the batteries." The fact was that this brigade was pretty well cut up. Out of only 1300 men present, it lost 71

killed, 335 wounded and 33 missing. Irwin went in a little to the left of the ground over which the other troops had been fighting. It was, in fact, over the ground upon which the surplus batteries of Hooker and Mansfield should have been posted and from which they could have had an admirable fire upon Jackson's flank. Franklin brought with him seven batteries, but none of them were much engaged. By this time both sides were greatly exhausted by the struggle around and in front of the Dunker church, and neither being disposed to renew it, each rested on the ground held by it, which was virtually the same as that held in the morning when the battle commenced. The battle had raged for about six hours and on an area of ground less than one square mile.

Hooker with the First Corps, numbering about 10,000 muskets, first went in and was repulsed with a loss of 417 officers and men killed, and 2051 wounded.

Then Mansfield with the Twelfth Corps, numbering about 7000 muskets, went in and was repulsed with a loss of 275 officers and men killed, and 1386 wounded.

Sedgwick, with his division of about 5000 men, then went in and was repulsed with a loss of 373 officers and men killed, and 1593 wounded.

Finally Irwin, with his brigade of not over 1200 men, went in and was repulsed with a loss of 71 officers and men killed, and 335 wounded.

In all, there were about 23,300 men engaged, with a total loss of 1136 killed and 5385 wounded, or 6521 killed and wounded.

The loss of the enemy was presumably about the same, making a grand total of 13,042. No other equal area upon the American Continent has been so drenched with human blood. There were but few prisoners taken, about 500 upon each side. The attacks were made successively by the Union troops, with sufficient interval of time between each to allow of their repulse being complete before the next attack. In this there was no generalship whatever displayed, and in the fight itself there was none exercised, further than that each commander held his command together as much as possible, and dealt his heaviest blows. That the troops were well led is attested by the fact that no less than seven general officers were struck down, together with a number of colonels commanding brigades.

While the artillery had but little opportunity, for reasons here-

tofore stated, to show what it was capable of doing, it nevertheless did invaluable service in repulsing the enemy and establishing a new line for the infantry. Under the circumstances it is astonishing that the batteries did so much in the battle. Some of them, pushing their way forward, fought with the enemy at the muzzle of their pieces, and, although often tangled up in the woods, lost but one gun, and the battery from which it was lost, was so fortunate as to bring from the field one of the enemy's pieces in its stead.

Jackson's position at the Dunker church was prolonged to his right by D. H. Hill's Division of his own corps and Walker's Division of Longstreet's Corps.

While the battle still raged in and about the woods of the Dunker church, French and Richardson were instructed to press the enemy in front of them, which they did most vigorously. The "Sunken Road," and other positions from which they forced the enemy, became historic from the carnage enacted there. The five or six batteries on this part of the line did gallant service, attending not only to the enemy in their immediate front, but occasionally to that part of the field towards the Dunker church. It was here that the surplus batteries of Hooker and Mansfield should have been posted.

The division of R. H. Anderson of Longstreet's Corps, came to the assistance of those of Walker and Hill, but all were unable to regain the ground lost. Lee says of this: "The heavy masses of the enemy again moved forward, being opposed only by a few pieces of artillery, supported by a few hundred men belonging to different brigades rallied by General D. H. Hill and other officers, and parts of Walker's and Anderson's commands." The truth was that these troops, outnumbering French and Richardson perhaps three to one, were so badly demoralized that it was with the greatest difficulty a sufficient number of them could be rallied to make a show of holding the line.

The battle in front of Jackson having now ceased, that upon this part of the line also came to an end, and Sumner's divisions bivouacked for the night upon the ground they had so gallantly won. This was the only permanent gain during the day.

A little to the left of Richardson, who, by the way, was mortally wounded at this place, were the horse batteries before mentioned, which, having crossed at the centre bridge, took position close under Lee's line directly in front of Sharpsburg. These

batteries, together with the long-range guns beyond the creek, did most excellent service. Still further to the left is the bridge over which Burnside was to have crossed early in the day.

The bridge is a stone structure of three arches. The road from it on the side held by the rebels curved up through a ravine and over rolling hills to Sharpsburg, distant about one and a quarter miles. The approach to the bridge on Burnside's side was somewhat exposed, but the ridges in rear afforded excellent positions for batteries to sweep the further side. Along these crests and knolls were stationed ten batteries, two of which were 20-pounders. The opposite side was held by a detachment of Toombs' Georgia Brigade, numbering in all 403 muskets, and one battery of four pieces. A little in rear was another battery, also of his command. This little command was strung out, covering the stream for about half a mile, with orders to prevent the enemy from crossing as long as possible, and then to fall back to a hill about 400 yards in rear of the bridge, which it was to hold as long as practicable, after which it was to fall back and take position in the line of battle about six or eight hundred yards in rear of the bridge. This line of battle was on a continuation of the crest of the main ridge occupied by Lee, and which extended on around to the Dunker church, distant about two miles. The right of this line was held by D. R. Jones' Division of Longstreet's Corps. The remainder of this corps was on the left assisting Jackson. Along and near the stream was a fringe of timber: beyond that, the ground, ascending rapidly, was open farm land, intersected by strong stone walls and fences, of which the enemy took every advantage for cover. Toombs sheltered his men as much as possible behind trees, inequalities of the ground, and by some very slight breastworks of rails, stones, etc.

About the time that Hooker was making his assault on Jackson, Burnside received orders to force his way over the stream and attack vigorously the right of the enemy; but his attempts to cross the bridge were dilatory and feeble. As things were beginning to assume a very unfavorable aspect on the right, McClellan sent him other and still more imperative orders to cross. Still he wasted the time until one o'clock, when a couple of his small regiments charged over the bridge, while at the same time Rodman's Division forded the creek a few hundred yards below and, marching up, routed Toombs' men from their cover. Slowly his entire corps filed over the bridge and formed in line on the

opposite side. Four of his batteries crossed likewise; the other six remained, occupying positions from which they could render service by covering his flanks and reaching the enemy upon the crest.

In this operation of crossing, the batteries do not seem to have been used as vigorously as they might have been; otherwise a concentrated fire from so many pieces would have soon cleared the way.

It was not until about 3 o'clock that Burnside was induced to advance. This his corps did with alacrity, and, moving steadily up the hill, broke through Jones' line and into the outskirts of the village. Burnside was in a fair way to double up and roll back Lee's right, when at this critical moment A. P. Hill, with his powerful division of Jackson's Corps, arrived, and at once attacked and crumbled up the left of Burnside's line, causing the whole of it to retire to the banks of the Antietam under cover of the batteries upon the opposite side. Although Burnside lost but a score or so of men in forcing the bridge, he lost very heavily—2220 killed and wounded—in the desperate fighting that took place on the ridge. Hill and Jones together lost but 1024. They had greatly the advantage in position. Hill had marched that morning from Harper's Ferry, distant fifteen miles; had forded the Potomac at Shepardstown; and came in, like Blucher, to make Antietam a Waterloo for McClellan.

At sundown on the day of the battle, Lee, owing to the arrival of Hill, was probably in better condition to meet assaults than in the morning, and could have resisted indefinitely, had McClellan continued to assault by piecemeal. But matters in other respects had not developed as he had expected, and it was clearly his best policy to place the Potomac between his army and that of his adversary as speedily as possible. He remained, however, the whole of the next day before commencing this movement. To have left the field at once would have been to acknowledge defeat.

Two of McClellan's corps, those of Porter and Franklin, were quite intact, as they had been but very slightly engaged on the 17th. During the following day Couch's Division joined from Maryland Heights, as did also Humphrey's Division of new troops from Frederick; making altogether two-thirds as many fresh troops as McClellan had engaged on the 17th.

But McClellan was cautious, perhaps over cautious. Nothing

but his army stood between Lee and the National capital. A decided repulse would be an unmeasurable misfortune, and there was no certainty that he could fight his army better on any other day than he had on the 17th. He therefore allowed the 18th to pass without attacking, and during that night, commencing immediately after dark, Lee silently and successfully withdrew across the river, leaving his dead and wounded on the field; an acknowledgment, in popular estimate, of defeat.

It was in reality a drawn battle. But a drawn battle, to an invading army, is little less than defeat.

As soon as Lee's movements were discovered on the morning of the 19th, the cavalry and horse batteries, following in pursuit, came upon the tail of his column as it was leaving the ford on the opposite side of the river. A few shots from the batteries developed the fact that Lee had taken the precaution to line that side with batteries covering the ford. It was therefore deemed not advisable to attempt to cross in pursuit. Porter now arrived with his corps, and posting his batteries, as also some from the Reserve, on the ridges along the river, a hot artillery duel ensued, in which the fire of the opposite batteries was so much subdued as to permit Griffin to cross with a brigade of infantry. Lee's batteries had been strangely left without much support, and Griffin was enabled to secure five or six of the pieces, after which he withdrew.

On the following morning Porter sent over the divisions of Morell and Sykes to make a forced reconnoissance. A. P. Hill was sent to meet them, and a fierce engagement ensued. Hill says:

"The enemy had lined the opposite hills with some 70 pieces of artillery, and the infantry who had crossed lined the crests of the high banks on the Virginia shore. My lines advanced simultaneously and soon encountered the enemy. This advance was made in the face of the most tremendous fire of artillery I ever saw, and too much praise cannot be awarded my regiments for their steady manœuvring step."

Hill's numbers were too much for Porter's small divisions, and they were forced to retire. The enemy following, and screening themselves from the effects of the artillery fire behind trees and inequalities of the ground, and in some lime-kilns along the banks, opened a most deadly fire on Porter's troops as they forded the river, a most difficult crossing even without such a

fire. The slaughter was pitiless; the men were shot down by scores as they waded the river, and were swept away by the swift flowing current.

In this affair Hill reports his loss at 30 killed and 231 wounded,—total, 261. Porter's loss was 68 killed, 136 wounded, and 123 missing,—total, 327.

This closed the fighting connected with the Antietam campaign, in which the Federal losses were 2082 killed and 9582 wounded, a total of 11,664, or more than 25 per cent. of the force actually engaged. The reported loss of the Confederates was 10,691 killed and wounded.

Up to this time Antietam was the heaviest battle of the war and remained to the end, the heaviest single day contest. It demonstrated the great difficulty of securing exact coöperation between troops acting disconnectedly on a field, and conveys the moral that a general should not attempt important operations, requiring prompt and unhesitating action, without knowing the personal equation of the generals upon whom he is to rely for carrying out his plans.

In this entire campaign not a gun was lost save one, and the battery losing it was so fortunate as to secure one from the enemy on the field in place of it. The enemy lost fourteen pieces in all.

The position occupied by Lee was decidedly more favorable for artillery than that held by McClellan; but, owing to scarcity of ammunition, his batteries did not do so much firing as those of the latter. They were held in hand back of the ridge and were brought forward when and where needed. His battalion system enabled him to do this, and thus, while economizing ammunition, always to have a superior force at the point most requiring it.

Owing to the defective system of the Army of the Potomac, the quantity of ammunition expended was generally out of proportion to the good accomplished. Brigade and division commanders always wanted their batteries to fire whether their positions enabled them to do so with effect or not; and battery commanders, themselves, desirous of not being backward, accepted the situation without question.

At the commencement of the Antietam campaign General Hunt was appointed chief of artillery for the Army of the Potomac; a position which he ably and satisfactorily filled until the close of the war. Up to this time he had commanded the

Artillery Reserve, which gave him the experience which enabled him to perceive the glaring defects of the artillery system in vogue. From this time on he was untiring in his efforts to secure an organization of greater efficiency; but the system had already worn a groove from which it was difficult to extricate it, and it was not until after the disastrous Chancellorsville campaign that he succeeded in effecting a change from the dispersed system to one of concentration, by uniting the batteries of each corps into one brigade, under commanders with appropriate rank and official influence.

General Barry, the former chief of artillery, was assigned to duty in Washington as inspector of artillery,—a new office, the functions of which comprised supervision over artillery matters pertaining to all the armies. Up to this time there had been no one to collect and systematize data, upon this branch, and make it available for use in the War Office. The consequence was that things went a great deal at hap-hazard, resulting often in grave blunders; as, for instance, upon one occasion some batteries were required without delay for a certain expedition. The official in the War Office, looking over the returns, found batteries, here and there, at places in the North, apparently available for service at the front, and these were accordingly ordered to join the expedition forthwith. But, when they reported, it was discovered that they had neither guns, horses, nor other equipments of batteries ready for the field; only the officers and men,—batteries only in name. There was no chief of artillery, with a bureau in Washington, to regulate such matters, and it was partly to supply this deficiency that the temporary office of inspector was created.

An artillery camp of instruction was established at Washington, where the newly raised batteries were received, equipped, instructed and prepared for the field. Other such camps were established for the Western armies.

It was during the Antietam campaign that the horse batteries of the Army of the Potomac began to become identified with the cavalry service; and it was during this campaign that the latter service began to *walk alone*. In the original organization of that army, the cavalry, with the exception of a small reserve of a few regiments, was attached, by regiments or squadrons, to divisions; after corps were formed, to corps, a regiment or so to each corps; and there was no head to it anywhere, not even a nominal chief at headquarters. Thus dispersed its services amounted to almost

nothing. Its range of operations extended scarcely beyond the infantry pickets of the corps to which it was attached.

Colonel Crowninshield admirably describes its status at this period when in his article "Cavalry during the Rebellion," in the May number of the MILITARY SERVICE JOURNAL, he says:

"Until 1862, in the summer, in the Federal Army the cavalry was groping about for its place in the field, while learning the elements of its duty. During the Peninsular campaign it did nothing to gain a reputation, being hardly mentioned in dispatches; while Stuart won a brilliant reputation by his raid around McClellan's army, and originated the 'raid' which afterwards became such a feature in every campaign. Pope, in his campaign, exhausted the mounted troops by hurrying them hither and thither, * * * Lee used his intelligently, and, with half the work, it did not only good service but gained a brilliant reputation."

Lee, when crossing the Potomac, covered his movements by a well-organized cavalry under that energetic leader, "Jeb" Stuart, and to penetrate his intentions and discover his whereabouts, McClellan was forced to concentrate his cavalry and give it an organization enabling it to act independently of infantry commands. He accordingly formed it into a division of two brigades, under Pleasanton and Averill, both of whom were active, and soon demonstrated the proper use to be made of this arm of service. At the same time Buford was made chief of cavalry.

Up to this time the four batteries of horse artillery had divided their services between the cavalry and infantry. When advancing up the Peninsula they were with the cavalry in the advance, and in retiring down the Peninsula assisted it to cover the rear. They accompanied it when endeavoring to discover Lee's intentions and movements prior to the battle of Antietam; but in that, as well as in most of the principal battles of both campaigns, they fought with the infantry, and established for themselves a distinguished reputation. After the Antietam campaign they began to serve exclusively with the cavalry brigades; but it was not until after the Chancellorsville campaign in the following year that they became a permanent fixture to the cavalry, which by this time had become greatly increased in numbers. The Antietam and Chancellorsville campaigns had so developed the functions and use of horse artillery as to call for an additional number of batteries. Accordingly, immediately after Chancellorsville, four additional batteries were so equipped and placed in readiness for

the Gettysburg campaign, and still another battery came in by absorption with the cavalry division of Stahl from the valley of Virginia. These nine batteries were organized into two brigades, each under its senior captain, who was assisted in his duties by a suitable staff, and with supply departments necessary for independent and efficient service.

It may here be remarked that these two brigades were the first properly organized artillery commands—the Artillery Reserve excepted—in the Army of the Potomac, or, for that matter, in any of the Federal armies. The long marches and wearing service required of batteries serving with cavalry suggested that, ordinarily, the brigades should alternate in the performance of it; thus affording them time and opportunity, between terms of duty, to refit and recuperate.

It is not out of place here to remark, that the service of field batteries differs essentially from any other branch of the service. While it has the ordinary duties of both infantry and cavalry, it has, in addition, that which belongs to artillery as a specialty. A battery, to be efficient, must be complete in all its parts; in its personnel, its horses, its guns and carriages, its ammunition and its means of repair. It moves and operates as a whole, the strength of which is measured by its weakest part. An infantry or cavalry regiment may become greatly reduced in numbers, but that which remains is proportionally as effective as before. Not so with a battery, which, to be efficient, must be complete in all its parts—in officers, men, horses and material.

Pre-eminently is this the case with batteries of horse artillery, the service of which, with cavalry, frequently requires them to be remote, for indefinite periods, from sources of supply.

The nature of cavalry service requires it to act more or less as detached brigades. In this the service differs essentially from that of infantry, which, except for special purposes, operates more in masses—by divisions and corps—and with the combat as its objective rather than raids and reconnoissances. The cavalry, acting more or less as detached brigades each requiring the service of artillery, calls for an assignment of batteries differing from that of those serving with infantry. While it is detrimental to the efficiency of batteries to be attached to brigades of infantry, or even to small divisions, it is entirely proper that they should be attached to brigades of cavalry. The reasons for this are too obvious to require extended explanation.

The horse batteries of the Army of the Potomac were organized, as before stated, into battalions (brigades they were called), and when the cavalry moved a battery was generally assigned temporarily to each brigade. When the duty was ended the batteries reunited, and recuperating, prepared for the next move. The duty was necessarily arduous and exhausting to both men and horses. Days and nights of marching, in all kinds of weather and over the most difficult roads,—it mattered not what was the occasion,—the batteries always managed to pull through, and were equal at all times to their comrades of the cavalry in capability of overcoming difficulties. And in this duty they had their full share, too, in the engagements, combats and skirmishes of the cavalry, which in the aggregate were equal to great battles, and were far more trying.

After the battle of Antietam, McClellan distributed his army in camps so as to guard the Potomac from Williamsport to Harper's Ferry, waiting for the river to rise so as to make it impossible for the enemy to ford it again; after which he proposed to concentrate somewhere near Harper's Ferry and then move upon the enemy in whatever direction it might best be determined. Meanwhile Lee had his army distributed from Martinsburg to Winchester. Both commanders were exerting themselves to their utmost in recuperating their armies from the exhaustion caused by the three arduous campaigns through which both had passed since the beginning of April. Lee had the advantage of the conscript system, which enabled him to fill up the companies of his old regiments; while the additions received by McClellan were chiefly new recruits with fresh officers, all of whom had to be instructed from the alphabet up. The veteran regiments, with their experienced officers, were allowed to dwindle away, many of them to almost nothing.

While the two opposing armies were thus engaged in recruiting and refitting, Lee projected a cavalry "raid" into Pennsylvania, for the purpose, as he says, of ascertaining the position and intention of McClellan's army; of destroying depots of supplies and lines of communication; and of capturing from the farming districts as many horses as possible. He hoped, in addition, greatly to benefit the Confederate cause by the moral and political effect that such an enterprise would produce both at home and abroad. He felt that his army had lost greatly in prestige by being driven back across the Potomac, and he thought that a

raid of this kind would indicate that he was still master of the situation.

He intrusted the raid to his active lieutenant J. E. B. Stuart, but before starting him he caused the partisan leader, Imboden, to make threatening demonstrations against Cumberland, Maryland, which had the desired effect of drawing off in that direction a large part of McClellan's cavalry under Averill. The latter, accompanied by a horse battery, left the vicinity of Hagerstown on the morning of October 9th, and arrived at Green Spring, near Cumberland, on the following morning, a distance of fifty-eight miles through the Allegheny Mountains, in twenty-four hours. Averill being thus out of the way, Stuart crossed the Potomac in his rear with a picked body of 1800 cavalry and a battery of horse artillery. Guided by sympathizing citizens of Maryland, he pushed forward to Chambersburg, Pennsylvania, where he found hospitals filled with sick and wounded, and large quantities of clothing and other supplies for the Army of the Potomac. Such of these supplies as he could not make use of he destroyed. He had appointed Wade Hampton his provost-marshal, and the latter was not slow in burning the depot, store-houses and other property. From Chambersburg, Stuart struck southward for the mouth of the Monocacy, near which he hoped to find some ford of the Potomac unguarded. He arrived at this point on the morning of the 12th, having travelled a distance of 90 miles in 48 hours; gathering on the way about 800 good cavalry horses, besides destroying an immense amount of public and private property, as well as cutting and interrupting all lines of communication.

Following close after this raid, an epidemic broke out among the horses, almost paralyzing for a time the cavalry and artillery service of both armies. The disease had the form of sore tongue, which prevented the horses from eating. It also affected the feet, in some cases to such an extent that the hoofs sloughed off.

This and other reasons prevented McClellan from making any movement until October 26, when he commenced crossing the Potomac at and below Harper's Ferry, with the intention of concentrating at Warrenton, from whence he could move against the enemy according to circumstances. This movement caused Lee to make a parallel movement up the Shenandoah Valley, with the Blue Ridge between the two armies. The cavalry and horse batteries, skirting along the east side of the mountains, guarded the

right flank of the Federal army. At nearly all the passes they encountered the enemy in greater or less force, and daily, almost hourly, skirmishes took place, in most of which the batteries alone were sufficient to dislodge the enemy from the positions held by him.

Meanwhile the army had moved unmolested to Warrenton, where, on the 7th of November, 1862, McClellan was relieved from the command and Burnside appointed to it.

This therefore may be assumed as the termination of the Antietam campaign. The next paper will be a sketch of the Fredericksburg campaign, under Burnside, and of Chancellorsville, under Hooker.

MILITARY SERVICE REFORM.

By COLONEL THOMAS M. ANDERSON, 14th U. S. Infantry.

THE War Department has informed Congress that for the Army, the one thing needful is reorganization. Congress by its action has answered, that for the present, reorganization it cannot have.

A well-considered reorganization would be a benefit; but it is not what we most urgently need, nor what we should have first. An eminent Senator once said to the writer, that he had never known a line officer to advocate an Army Bill that did not have for its purpose promotion; nor the Department Bureaus to favor an Army measure that did not increase the rank and power of the staff. This was not a pleasant thing to hear from a man who had been twelve years in the Senate, and for the greater part of the time on the Judiciary Committee.

Like old Caleb Balderstone, I deprecated as well as I could for the honor of the family, yet I have strong suspicion that what the Senator said was true. Before we go again to the law-making power for reconstruction and reform, let us have, what pious people call, an examination of conscience. Let us try and ascertain what we do need. Let us find out if we can, whether there is need of Military Service Reform as there has been for Civil Service Reform.

If we compare the Regulations of 1847 with those of 1889, we will find that there has been a change not only in form but in substance. Comparison will show that changes have been made both in methods of administration and theory of discipline.

If we deduct from the old regulations the article relating to field-duties, inspections and parades, which are now omitted from our blue-book, it will be found that the number of paragraphs have been increased by one-third.

Many of our added regulations are the results of our war experience. Others have been made necessary by changes in the business methods of the country.

But railroads, telegraphs, clearing-houses, and produce exchanges have simplified commercial transactions. Why then should our Army administration have grown more complex? Why should our reports, returns, and estimates have doubled in number, and become more complicated in kind? What think you of quintuplicate returns and sixteen routine endorsements on certain papers? There is an old saying, that genius simplifies while mediocrity rejoices in complexity. It is also said that theorists elaborate machines that break down of their own weight and come to a full stop from friction.

Referring again to the Regulations of 1847, we find in Article LIV., under the heading "Staff of the Army," the following: "The General Staff comprises all the officers concerned in regulating the details of the service and furnishing the Army with the means necessary for its subsistence, comfort, mobility, and action. These officers act under the name of the commanders under whom they are placed, and perform their functions according to the rules and regulations of their respective corps and departments."

The general staff was announced as the adjutant-general's, inspector-general's, quartermaster's, subsistence, medical, and pay departments. The staff corps were the engineers, topographical engineers and ordnance. There were no chaplains, judge-advocates (except for courts), no signal corps.

In those primitive days the duties of the staff were divided into active and sedentary. Active—how exhilarating! sedentary—how soothing! (See paragraphs 884 and 885.) Then the officials of all the departments named, with the superior apothecary (for so the dignified medical purveyor was called in those degenerate days) were attached to general headquarters for the direction of their departments of service.

The only allusion to the quartermaster's department is in a foot note in Par. 185, which refers back to the Regulations of 1841. When we get that far back, we find it just succeeding to the anomalous "Purchasing Department."

The expression "Quartermaster General" does not occur in the volume. Now this functionary really controls the Army. Then, the quartermasters were a committee of ways and means. At the siege of San Sebastian, the Duke of Wellington placed his chief quartermaster in charge of the siege operations, saying he wanted less science and more work. But when General How-

ard started after the Nez Perces he relieved his chief quartermaster from field duty, saying, when he required for a rope he wanted a rope and not a reason. In military life it does not matter what you call a man, provided he does something and does it well. As our De Witt Clinton said: "It is all right to call a chaplain a brevet bishop, if he only cures souls; or to call a doctor a field marshal if he only cures the body."

To return again to our subject, the old regulations provide that (Par. 49) "The General will watch over the *economy* of the service, in all that relates to the expenditure of *money*. * * * In short everything which enters into the expense of the military establishment, whether personal or national. He will also see that the estimates for the Military Service are based on the proper data. * * * In carrying into effect these important duties he will call to his aid the staff." Mark! It was the General that used to do this.

Turn now to two brief paragraphs in our present regulations. You will find one a vague generality about discipline, and the other a very positive inhibition about administration.

In Article LXII. in the new regulations we find no mention of a general staff. "Staff officers assigned to the command of a general, or other officers, are under his supervision and control in all matters affecting his command which are not specially excepted therefrom by the regulations and orders of the War Department." Aye! there is the rub—what is not excepted?

Whether for better or worse, the power and functions of the bureaus have been largely increased. Instead of being part of a general staff under such coördination and control as should insure prompt and energetic action on the part of all, they have become specialized agencies when acting apart, and a sort of Aulic Council when taken together. The advocates of centralization say that this is as it should be. That the great improvements of the age are made by specialization. That the bureaus should have a quasi independence under the directing power of the executive; and finally they say, "It is the law."

"Aye! marry is it. Crowner's quest law."

It is not at all politic to criticise existing laws, yet if they were not changed from time to time, there could be no adaptation to changing circumstances.

The President is, and should be in fact, as in name, the Commander-in-chief. The laws and regulations should be made so

that he can use the Army as a unit, and not as an aggregation of functions. It is a force to be used, not an eleëmosynary institution to try philanthropic experiments on.

What justifies the maintenance of an army? It is with us, a policy of insurance to protect sixty-five billions of property, and the liberties of sixty-five millions of people. If the instrument is needed it should be perfect in kind.

What do we require to make it what it should be? Senator Hawley and Mr. Cutcheon say, in our behalf, that it is reorganization. Compared with numbers, discipline and spirit, a change of organization is not much more important than a change of coat. If organization could have secured success the Romans should have whipped Hannibal, and the British should have conquered the ragged Continentals.

What we do want is more men and more money. In the last debate of the Army Bill in the House of Representatives, the Chairman of the Military Committee was asked repeatedly if his bill did not call for more men and money. Over and over again he denied, saying, we only wish reorganization. It was a false issue.

Mr. Cheadle cut to the quick when he asked: "If reorganization is all you want why do you not reduce the number of your regiments? If you do not wish more money, how will you provide for the additional pay for fifty majors and fifty captains?" Then he added, "It *is* more money and more promotion you want, but not more men."

Did we suffer shipwreck on this paltry $50,000 in a Congress that has voted away five hundred and forty-five millions? The trouble was, in my humble judgment, that our representatives did not state our case fairly for us. We do want promotion, but we should not strive for it by making a small Army, already top-heavy, more top-heavy still. Those who spoke for us should have said: We need promotion, but we wish to get it by an increase of the whole Army, not by cutting down the number of men and breaking up organization. We do need a new organization, but with the necessary increase of force. We need and wish for more artillery, but not until Congress is willing to provide for it without hesitation and mental reservation. With our large wealth and population, and the ever increasing complexity of our foreign relation we do need a larger Army. We should have the courage and honesty to say so, and let the responsibility of refusal rest

where it belongs. We are eternally deluding ourselves with the fancy that congressmen do not know that we have a disproportionate number of officers in the Army, and particularly of the staff.

The present Secretary of the Treasury, when Chairman of the Committee on Appropriations, jestingly called my attention to the guileless habit of the heads of bureaus of assuming that our Solons know nothing of the Army, and that they should take everything on faith. It requires a good deal of faith to believe in the necessity of thirty quartermaster captains and twelve commissary captains, when none of these officers perform duty at Army posts. It requires unquestioning faith—faith as an evidence of things unseen—to accept the necessity of a signal general over a corps of fourteen officers and less than two hundred men.

The obvious reason for so much inconsistent Army legislation is that Army officers cannot be members of Congress. Ours is the only country where military men are ineligible by law to seats in the National Legislature. This seems the more unjust, since we alone of nations have never suffered from military usurpation, but on the contrary have received the greatest benefit from the heroism of our Army and Navy.

Our general and staff officers bear the proportion of three to eight to the officers of the line.* The Staff Corps and Departments cost one sixth of our total expenditure, notwithstanding the fact that over two hundred line officers are detailed to do staff work, and also a very large number of enlisted men. This thing of spending fifteen dollars to get the other eighty-five where they ought to go, is rather expensive financiering. Is it any wonder that the aggregate cost of the Army is a thousand dollars a man?

When General Harney was in command of the Department of the Columbia, Alfred Pleasonton was sole A.D.C., adjutant, inspector-general and judge-advocate. Dr. Barnes was presumably medical director, for he directed himself and gave out all the pills and powders. Theodore Eckerson ran the ordnance, and Rufus Ingalls did all the rest of the work for post and Department, and did it well.

Now with the headquarters at the same place, there are eleven staff officers at headquarters and three more in Portland—seven miles away. When we add in our proportion of the mainten-

* The exact numbers being 579 generals and staff officers and 1591 line officers.

ance of Division headquarters in the cost of administration for less than three regiments it amounts to a very respectable sum.

If Congress is willing to meet such expenses it would seem unreasonable to object. Yet, unfortunately, the expense of our small Army prevents our National Legislature from voting a necessary increase; and the cost is only one objection under existing laws. The War Department has to open a book account with every man in the Army from the general to the bugle-boy. Worse than this, nearly every purchase has to be authorized in Washington. Lastly, the most objectionable feature in our administration is our contract system. For this the Army is not responsible. Napoleon and Wellington both denounced military contracts as unsatisfactory. In our wars, contracts have proved costly and often unsatisfactory. Yet the method is fixed on us by law. At times it seems to be the best expedient, yet it does seem inexpedient to adopt it as a fixed rule.

Our staff system of course has its strong points. It is capable of easy expansion in war, and has at all times the merit of accuracy and precision. Its division of labor is excellent; the best probably of any modern army.

But since the bureaus have each and all hitched their wagons to a star, they have become too fine for rough and tumble use. With generals for their heads they have set up to criticise and improve the Army. As our interests in certain ways are conflicting, their advice does not always seem disinterested.

This point is so important that it should be clearly stated. No one, I apprehend, would think of asking Congress to lessen the authority of the Secretary of War. As the executive officer of the President it would be hard to limit his power, without incurring a risk of impairing the efficiency of the service. The question is, cannot his work be lessened without lessening the power of the President? And further in this direction; why cannot the work of the bureaus be lessened by leaving methods of discipline and details of administration to division, department and regimental commanders? Is not a general on the Pacific, or a colonel in the sage-brush, as much an integer of the War Department as an officer or clerk in the marble palace on Pennsylvania Avenue. In short, why should not the President use the General Commanding the Army as his chief of staff? His power as Chief Magistrate would not be lessened, but only diverted through another channel. There would be enough, and

more than enough important work left for the Secretary and the bureaus.

Who can doubt but that it would be for the best interests of the service, if the heads of departments could be relieved of many vexatious details? It is said by many that absolute uniformity is necessary; undoubtedly a general uniformity of method is important, but not absolute identity of administration in petty details.

"Why has not man a microscopic eye?
For this plain reason—man is not a fly."

Referring again to the subject of centralization, let us see how we have drifted into it, In 1812, the French Republican General Moreau was in the country, and there is a tradition that he was willing to accept a commission in our Army if he was given entire control. This Mr. Secretary Eustis would not concede even to the hero of Hohenlinden.

The next year General Armstrong assumed to plan and direct military operations as Secretary of War. The disasters which followed discouraged succeeding secretaries from pursuing such absolute control. When the Mexican War broke out Generals Scott and Taylor were whigs, and the administration was democratic. After the failure in the attempt to make Mr. Benton lieutenant general, Mr. Marcy began to curtail the authority of generals in the field. Mr. Jefferson Davis, although a States rights democrat, carried to an extreme the theory that the Secretary of War had full control in military as well as financial matters.

It is not to be inferred from this *resumé* that the central power shall not be autocratic. It is suggested with all deference that it should be directed equally and justly in the non-combatant staff as in the fighting line.

It is conceded, of course, that bureau officers should be consulted as to financial management, and to the ways and means of administration, but not exclusively as to matters of military policy affecting parts of the Army serving thousands of miles away. The sorrowful jest of the barracks is that "the tail wags the dog."

But when boiled down to a residuum the objection to the staff is that it is too expensive and too suggestive.

I think that a majority of line officers still favor the rotating system of staff details proposed by the Burnside Bill. When

that measure was up for consideration, General Sherman was asked what he thought of some proposed reduction of the line. He replied that it would be better to dispense with every officer whose name appeared in the first fifty pages of the Army Register, his own included, than to muster out a single regiment. It was not strictly true, but it was a noble and patriotic utterance.

Why should not our general officers be allowed greater authority? We are generally referred by way of answer to two instances where Department commanders spent all the money they could get their hands on to ornament their headquarter posts. Such abuses of discretion are disagreeable, if not dangerous. There has been but one General Monk, but many political usurpers.

The purpose of this argument has been to show that there are parts of our military methods that can be modified to advantage. The laws as they stand must be enforced. As a Department commander once sententiously announced, "The law is supreme." General Grant held that the way to secure the repeal of a bad law was to enforce it.

Fifty years ago the idea was prevalent that the taxpayers' money was voted on the faith of estimates made by officers who endured the hardships and braved the dangers of the frontier. Now the Chairman of the Military Committee informs the House that some gentleman in a revolving chair has assured him that the sum of money asked is absolutely essential for his department. The old theory was, that to make men willing to kill whoever you told them to, or to risk being killed themselves, requires discipline to be rigid, swift and sure. It might shock the sensibilities of the philanthropic to quote the opinions of Wellington on this subject, or even those of Washington. But we wish to shock no one. We would fain forget what General Sherman said about the sad necessities of our profession. Let us smooth "the grim visaged front of war" and believe the Utopians when they tell us that the world is pleasantly rolling into a region of sweetness and light.

THE ORGANIZATION OF ARTILLERY DEFENSE.

By CAPTAIN JAMES CHESTER, 3d U. S. Artillery.

IN our last paper we attempted to show by examples taken from our own recent history, that the effect of artillery fire from fixed batteries was greatly overestimated; that steamers could pass such batteries "without much risk;" that they could not protect auxiliary defenses constructed directly under their guns, nor do serious injury to wooden war-ships subjected to their fire for twenty minutes at pistol-shot range. We tried also to trace the dawn of true ideas in the minds of some of the leaders North and South, on the subject of heavy artillery fire-effect. How General Grant discovered that it was a bugaboo. And how General Beauregard, who attempted to blockade the Potomac with four heavy guns at Cockpit Point, and prescribed seven 10-inch Columbiads for the water battery of Fort Walker, was forced to testify after the fall of New Orleans, that, in addition to channel obstructions, a true defense required a "concentration of the greatest number of heaviest guns at one's command." It would have been interesting to have the general's views as to a true defense, after the battle of Mobile Bay. We fear he would have been compelled to coincide with General Grant, and confess that, as then operated, sea-coast batteries might be passed by steamers "without much risk."

It must not be forgotten that our examples were not special cases selected to suit our own ideas. They cover the whole period of the War of the Rebellion, and exhibit the gradual growth of ideas on the subject of river and harbor defense. In their historical order they exhibit, first, the theories of 1861—a purely artillery defense; second, General Beauregard's theory of a true defense as based upon the experiences of Port Royal, and third, the complete defense of Mobile Bay based upon the experiences at Forts Jackson and St. Philip.

It will be remembered that General Beauregard's "True Defense" did not contemplate the coöperation of a naval force. No doubt the General disbelieved in coöperation. Certainly the experiences of Forts Jackson and St. Philip would have justified

such disbelief. Coöperation rarely coöperates, and divided responsibility is not conducive to success in any undertaking. It would be unwise then to depend upon naval coöperation for the defense of any sea-coast position. Indeed, the chances are, that the sea-coast defenses will have to defend the fleet as well as the position, until the former is able to maintain itself on the open sea.

As at Fort Jackson we found fruit from the seed sown at Port Royal, so at Mobile Bay we find fruit from the seed sown at Fort Jackson. In the latter case purely passive obstructions have given place to automatically active ones. The author of these defenses no doubt imagined that now he had found a "True Defense." But he had not. The enemy, by persistent reconnoitring under cover of darkness found out all about it, and measured the exact width of the gap in it, without discovery. Now, when the enemy knows all about them, any defenses lose half their value.

There was nothing wrong with the defenses of Mobile Bay. They were perfect samples of engineering art as then known, and it is doubtful if anything superior to them has yet been devised. Yet they failed to fulfill the expectations of their authors. The hostile fleet found the gap and passed through it endangered only by the blunders of some of its own members. Although the *Brooklyn* acted as an abattis, and held the fleet under fire for twenty minutes at 100 yards range, the artillery failed to make any serious impression on it. Why? Simply because the situation was unexpected, and Fort Morgan was unprepared to take advantage of it. The theorizers were again at fault. They always are.

In old times the power of artillery was measured by the calibre of its guns, and, to the laity at least, power and efficiency are synonymous. In duels between ships, if the vanquished had the lighter guns his ill success was accounted for. Professional men might demur, but the sovereign people were satisfied. This is not the place to argue that issue. We find the people's theory on the pages of history, and cite it as an early example of the gun mania. This disease has recently assumed a milder form, and seems to be on the decline. But it was a very serious attack while it lasted, amounting almost to professional insanity.

The rapid increase in the calibre of cannon made possible by modern discoveries and inventions in the art of gun-making, be-

ing interpreted according to the old-time idea which measured efficiency by calibre, has induced the wildest hopes and expectations even in the artillery mind, and so laid the foundation for professional humiliation and national disaster. The artillery cry to-day is "Give us guns!" They are still suffering from the gun mania. They are in the condition of General Beauregard when he prescribed the "seven 10-inch Columbiads" or "The greatest number of heaviest guns at one's command," which he called for at a later stage of the distemper. Guns were the great remedy; as if the *possession* of guns constituted "a true defense." That is what we call "The Gun Mania." Not because it is unreasonable, but because it is incomplete. Give artillerymen their ideal guns in satisfying quantities, and let them train themselves in their use upon the lines now followed at the Artillery School until they reach the triple standard of efficiency set up by Hohenlohe himself, and what would be their battle value? If we should answer *zero* we would be accounted mad. We shall not answer zero then. Indeed we decline to nominate a value. But we can tell how to find it out. Blindfold the cannoneers, and then, on some densely foggy day, open fire on a number of invisible moving targets the positions of which are unknown. Continue the practice for half an hour or so. Then count the hits. The number will give a fair idea of what the battle value really is.

If there be any truth in the principles which we endeavored to deduce from the examples cited in our last paper, it is manifestly the duty of artillery officers to organize and exercise their commands in accordance therewith. If false theories have prevailed, they should now be rejected. If General Grant's experience at Vicksburg justified his conclusions, artillery officers should never rest until they have found a reason for it, and if possible a remedy. We cannot dismiss the subject as General Grant did. He had made a discovery which might prove useful to him. But it was not his business to find out its cause or to prescribe a remedy. He may have fancied that the fault was inherent in the arm and beyond remedy. Indeed his subsequent treatment of the artillery arm indicates that that was the conclusion reached. But he could dismiss the subject with a light heart. He had discovered the true character of the bugaboo, and could rejoice in the unmasking of what had seemed a formidable adversary. Artillery officers view the subject from a different standpoint. If they must admit the historical facts which presented themselves to General

Grant as practical experience, they are unwilling to accept the rôle of scare-crows in the drama of sea-coast defense. They must clear themselves of that imputation if they desire continued existence. The handwriting on the wall is too legible to be disregarded.

What, then, was the matter with the artillery in the cases cited in our last paper? Are they still suffering from the same disease? And what can be done for them? are questions that must be answered, not only in word but in deed, if the artillery would be rehabilitated.

We deduced answers for these questions in our last paper, and need not to retraverse the ground. We found the cause of failure in the cases cited to be: "Defective equipment of the batteries, and defective training of the officers and men," and we asserted that the artillery were still suffering from the same causes. Our present task is to propose a remedy.

That we may not be misunderstood in what we have to say on this subject, it is proper to state here that we rejoice at the prospect we now have of getting a modern armament. Our argument is not against new guns but against the folly of putting the new wine, when we get it, into the old bottles. If we do we must be prepared for the result. As our old guns were rendered ineffective by a vicious system, so will our new. We must reform the system, and we must get rid of the gun mania. We have a right to demand that we be as well armed and as well covered as our adversary. There is no madness in that, and we are by no means blind to the importance of these elements in the great problem of defense. But they are not exactly our part of the problem. In our Army they are intrusted to departments separate and distinct from the artillery; very separate and very distinct indeed. This may or may not be a wise arrangement. We are not specially concerned with that question at present. We have to accept the machine as it is put in our hands, and make the most of it. We deprecate artillery interference with ordnance and engineer functions, and consider the time spent in acquiring a smattering of that kind of learning as so much time wasted. Not that there should be no coöperation between the corps in sea-coast defense. There must be coöperation. That there has been none, or practically none, until recently, was possible only because these corps had usurped artillery functions. These functions must be restored to the artillery in full before real efficiency can be attained.

Having gone thus far it is necessary that we should go further on this subject, or run the risk of being misunderstood. We say therefore, that, as the active defense is purely artillery work, the artillery should have the right to prescribe the defenses. Seeing and knowing the nature of the work they are expected to perform, they should have the right to prescribe the character of the machine with which they shall operate. It is a great mistake to assume that engineer officers—at least in our service—are specially qualified for this kind of work. Their professional training and experience are civil rather than military. Artillery officers must exercise their right to prescribe the number, calibre and equipment of the guns required for the defense of sea-coast positions, and the nature, extent and position of essential auxiliary defenses. Construction belongs to the engineers and ordnance, but the problem of defense is an artillery question.

The problem of defense has been a much neglected question. I doubt if it has even been accorded a place in the curriculum of the Artillery School. Let us look at it a moment. The elements in it are, 1st, the guns of any possible enemy; 2d, his ships; and 3d, the possible development of his fire against the position.

Here then we have a wide field for artillery activity. Artillery officers should be as familiar with the arms of any possible adversary as they are with their own. They should know every foreign war-ship and all about her armor, armament, draught of water, speed and coal capacity. They should know the topography of the position to be defended, especially that of its water approaches, the low water soundings of every foot of the channel and the rise of the tide. They should study out all possible formations for battle which an enemy might resort to in an attack upon the position, and determine the number of ships and probable number of guns which he could bring to bear upon any battery in the defensive system. They should study the enemy's ranges and calculate the striking energy and penetration of his projectiles, and their angle of fall. They should calculate the time it would take any of his ships to advance from extreme range to the auxiliary defenses, or to travel between any two distinguishable marks in the channel, at full speed, half speed, and slow speed. And in short make themselves thoroughly familiar with every possible enemy and every possible form of attack.

When we consider the number of positions to be defended, the number of possible enemies and the almost infinite variety of

methods of attack, we begin to get some conception of the scope of artillery work. Yet all that is but the preface to it. That is only the artillery officer's preparation for his legitimate duties. He must know all these things before he can deal successfully with the problem of defense. When he does know them thoroughly, that problem becomes less formidable.

When he knows the maximum number of guns which an enemy can develope against his position, and their calibre, he knows the number and calibre of guns which he must have to meet him on even terms. And thus the question of armament receives its artillery solution, and passes over to the Ordnance Department.

The distribution of the armament must next be considered. This is a tactical question and must be decided accordingly. It is simply forming the artillery line of battle, and is, or ought to be, the work of artillery officers. It means the selection of sites and assignment of armaments. This is one of the important artillery functions which the Engineer Department has usurped. Engineer officers would no doubt deny the usurpation, and claim that they had always exercised the function. They forget that their corps was once "The Corps of Artillerists and Engineers," and under that style and title exercised a great many functions which as naked engineers they should have nothing to do with. They simply divorced the artillery and kept part of their franchises, and have now got to believe that they always owned them. And strange to say, no one, not even artillery officers, are surprised at it. There would be a howl of indignation if any such pretensions were set up in relation to infantry or cavalry lines of battle. Tactical officers would never tolerate such interference. The artillery has endured it thus far without protest, and now some reparation is being made. The artillery is represented on the Fortifications Board, and it has a chance to recover some of the franchises of which it was illegally deprived when it was divorced from the engineers.

Here then we have another wide field for artillery activity. It has been a fallow field in this country ever since we were born into the family of nations, but it should remain fallow no longer. Instead of requiring our young artillery officers to study gun-construction and other purely ordnance subjects which never can be of any practical use to them, set them to work in the fallow field and see if they can raise anything useful. One thing is cer-

tain, they will learn to appreciate their profession even if they fail to solve its problems correctly, which is more than their present course of study can teach them.

But we have begun at the summit of our subject. The artillery functions which have occupied our attention thus far, have been those pertaining to the higher grades of the profession. To solve the problem of defense for any position, correctly, requires an amount of knowledge and a soundness of judgment to be looked for only in experienced officers. It belongs to the highest department of the art. But to be able to do it should be the goal of every artillery officer's ambition. It may be an easy matter to "set a squadron in the field," or even to form an infantry line of battle; because the pieces are movable and errors may be corrected. But there is no mobility in the artillery line. As it is established, so it must remain. Hence the necessity for great ability and care, long artillery experience and sound judgment in its establishment.

But let us now come down a step, and take a look at the working men of the profession. Let us assume that the artillery line of battle has been planned, constructed and armed; that the auxiliary defenses are in position, and an artillery garrison in possession. How should the artillery commander proceed in the equipment of his batteries and the training of his men so as to have everything in readiness to meet, effectively, an attack similar to that of Farragut on Fort Morgan?

We refer specially to Fort Morgan because it had the most complete system of defense, and proved to be the most disgraceful failure among the illustrations cited in our previous paper, and because it illustrates the evils of individualism and the dangers of false organization and training of artillery then and now. The example of Fort Morgan is simply perfect. Its commander knew that his hour of trial was approaching. He knew the character of the ships and guns that might be brought against him. He was allowed four years for preparation. He had plenty of guns, plenty of men and splendid auxiliary defenses. Moreover, he had the coöperation of a formidable fleet, which actually did coöperate and played the part of a flanking bastion to his water battery during the attack. Yet his defense was an ignominious failure. He had splendid opportunities too, during the battle. When the *Brooklyn* lay like a gate, closing the gap in his torpedo line—and he must have known her position from her topsail yards, the only

things visible—he should have been able to sink her. If he could have concentrated his fire on her he would have sunk her in all probability, and the chances are that Farragut would have been defeated. We cannot give that example too much prominence. It exhibits the plague spot of inefficiency so distinctly that it cannot be overlooked or misinterpreted.

Still we doubt very much if the commander of Fort Morgan realized what was wrong about his batteries. His men must have been well trained; his gunners had, no doubt, considerable practice. We judge on this point, however, from what we know to have been the Confederate custom, and not from any knowledge as to the special case. We assume that they were trained on the American plan, that is, the gunners were trained as individual marksmen. They had, perhaps, never been trained to act in concert. The batteries were not equipped for that kind of work. The commander could not control and direct the fire of his batteries even if he had desired to do so. The machinery for that kind of work was not in existence, and therefore, the batteries proved unmanageable in the hour of need.

The goal therefore, towards which all artillery organization, training and instruction should tend, is manageability. This applies to every artillery unit; batteries, groups of batteries, lines of defense, and systems of defense. The commander of every unit should be able to command, control and direct the fire of his unit under any and all conditions, as effectively and promptly as if it were all within the sound of his voice. To do this requires equipment, preparation, training and practice. But it can be done, and must be done, before the artillery machine will yield maximum results. This is no hypothesis set up to serve a theory. It is a solid fact, distinctly visible in every example which our war afforded.

The desired end being thus brought within view, the question becomes: How can we reach it, safely and surely, in the shortest possible time?

Let us look for a moment at the ideal machine, as we would like to have it. Let it be the ideal defenses of some important sea-coast position. And first let us look at the map or plan of the position and its defenses. We see there two clusters of works, separated by several miles from each other. These clusters are technically called lines, and are known as the outer and inner lines of defense. If we look carefully we shall see that each clus-

ter consists of several groups of works separate and distinct from each other. Each of these subdivisions is technically known as a group of batteries, and used to be called a fort. Each fort or group of batteries consists of a number of organizations, containing, say, four guns each. These are the batteries, the smallest units of organization. These batteries are all complete and manageable, either in themselves and by themselves, or as members of the next higher unit of organization.

The commander of a battery has perfect control of its component parts. He can by word or signal direct his guns on any object within his field of fire. His station, for he has a station, and must stay by it at drill or in action, is worthy of description. It is a casemate or conning-tower built into the middle traverse of the battery, and commands a full view of its field of fire. There are two chambers in that traverse. The front chamber is the conning-tower, and the rear chamber the room where shells are filled and fused. The conning-tower chamber is perhaps ten feet square, and has a loop-holed window in its front wall, through which the field of fire of the battery is visible. There is a telescope mounted on a vertical axis in the throat of the loop-holed window, which sweeps the field of fire and carries with it an index arm, which traverses a graduated azimuth arc. The graduations on the azimuth arc correspond to those on the traverse circles, and are similarly numbered from left to right, not in degrees and minutes, but in points, 1, 2, 3., etc. The captain's station in action is at the telescope.

On the right and left of the captain when at his station there are two lateral, embrasure-like openings, through which the guns of the battery can be seen and orders communicated *viva voce*.

There is a centre-table in the captain's conning-tower consisting of a large slab of slate or stone, upon which the chart of the harbor, divided as prescribed into squares, has been engraved, and the lines filled in with white lead, so that they stand out clear and distinct. This engraving is known as "The Chart of the Harbor." There is an exact copy of it similarly engraved on stone or slate, at the headquarters of each group, and of the lines of defense, and also at general headquarters.

But, we observe, that this one at the captain's station has some special markings on it. The field of fire of the battery, which is also the field of view of the captain's telescope, has been engraved on it. This engraving has a fan-shaped appearance

and consists of a number of radii drawn from the position of the captain's telescope to the arc which indicates extreme range. There are also a number of concentric arcs, 100 yards apart, embracing the whole field of fire of the battery from extreme range to that of zero elevation. The outer arc is graduated and numbered to correspond with the traverse circles and the captain's azimuth arc, and a radius is drawn to each graduation. We notice also, engraved in each concentric zone, certain numbers, which indicate the elevation required to carry the normal projectile to the middle of the zone under normal conditions. All these lines and markings have been engraved on the chart of the harbor and filled in with red lead, so that they stand out clear and distinct from the lines and markings of the chart which are filled in with white lead.

It will be observed that the markings for elevation refer to normal conditions only. When abnormal conditions prevail, such as inferior powder, heavy atmosphere or light projectiles, the captain must correct the chart elevations in accordance with his personal judgment. His experience should be sufficient for the detection and correction of all exceptions to the general rule.

In addition to the furniture already described, we notice in the captain's conning-tower, telephones and other electrical appliances, among which are firing arrangements, by which the guns can be fired by the captain, singly or by battery at pleasure.

It will also be observed that the position-finding service has no machinery or representative in the captain's conning-tower. When concentration of fire on any particular object is desired, its position is determined at group headquarters, and the number of the square which it occupies is reported thence to the several captains of the group.

Let us now visit a captain during drill exercise and see the machinery in operation. If the battery is drilling as an independent unit everything will be simple enough. The captain commands "Load," and by and by his lieutenants have each reported "Loaded." The captain then commands "Lay on 6 with 18," and very soon the lieutenants report "Ready." If the captain desires to fire a salvo he puts the peg in the proper hole on the switch-board, and then, first pressing the signal button which rings a warning bell in each platoon, presses the salvo button and all the guns are fired. Should he desire to fire by piece, he

changes the peg on the switch-board to the proper hole and presses in succession the four buttons, each of which fires a gun.

That is all exceedingly simple. Now let us see how matters are managed when the battery is being drilled as a member of the group. In this case the commandant of the group controls and directs the fire. We shall visit him presently and see how he manages. Meantime we remain with the captain to see how he manages under control by superior authority.

While independent battery drill is progressing as already described, a warning bell rings which calls attention to the commandant's telephone, and an order is received "Fire on 40." The captain looks at the chart, notes what radius passes through the designated square, and what range-zone it lies in, and having observed the figures commands "Lay on 49 with 10," or whatever the numbers may happen to be, and when his guns are reported "Ready" fires the salvo, and continues the performance until otherwise ordered. If the command was "Fire at will on 40," his command to the battery would be "Fire at will on 49 with 10," and the lieutenants would continue the fire until otherwise ordered. If the command was "Ready for a general salvo on 40," the captain would command "Lay on 49 with 10," and when his guns were reported ready would change the peg to the proper hole on the switch-board and report "Ready" to the commandant.

If the captain were questioned on the subject he would tell us that the cannoneers were drilled and instructed in the service and laying of the guns by the lieutenants, each lieutenant drilling his own platoon, but that the firings, actual or simulated, were conducted by the captain or some higher authority, unless specially ordered otherwise.

Before leaving the battery we may as well visit a lieutenant and see how he manages. So far as the manual is concerned we notice nothing new until the command "Lay on 15 with 5" was given. This seems to have been substituted for the old command "Aim." When it was given the gunner placed himself opposite 15 on the traverse circle and caused the carriage to be traversed until the index on the chassis pointed to 15. He then set his elevating arc to 5, and mounting on the step of the carriage placed the arc in position and caused the breech of the gun to be raised or lowered until the bubble stood in the middle of

the tube. He then removed the arc, reported "Ready" to the lieutenant and took his post.

Let us now visit the group commandant. We find him at his station in a conning-tower similar to that of the captain, but with a view of the field of fire of the whole group of batteries. There is a centre table in it similar to that already described, with the chart of the harbor engraved on it in the same way, but without any of the red lines which we saw on the captain's chart. We notice, however, some new markings on this table. It is graduated in two series round the edges to read directly to minutes. The centres of graduation which represent the ends of the measured base are furnished with station posts secured firmly in position by nuts screwed on their projecting ends under the table. Pieces of fine steel wire attached to rings which fit over the station posts complete the outfit of the table. These wires are attended to by two non-commissioned officers. There are several other non-commissioned officers in the commandant's conning-tower attending to the telephones which connect with the captains of batteries and the base-end observers.

When the group of batteries are being exercised together the firing, as already said, is controlled by the commandant. Suppose we visit the commandant's conning-tower during drill exercise. We find him at his telescope, scanning an approaching steamer. Presently he says "Ready for the position of such and such a steamer," and the warning is telephoned to the base ends. Almost immediately the message "Ready" arrives from both observers. The commandant then presses a button which rings a signal bell at both base-ends, and in a moment the angles are reported. The plotting sergeants stretch the wires to the indicated graduations, and the adjutant noting and marking the position of their intersection, reports the number of the square. The commandant, again consulting a stop-watch which he has before him—he consulted it first when he first rang the signal bell—rings another signal, and another observation is taken and the angles reported and plotted, the adjutant again marking the position. The speed and course of the steamer are now known, and the commandant is able to anticipate her arrival in any square. Knowing the time required to lay the guns, he can select the square in which the steamer shall receive the salvo, and give his orders accordingly, just as we have already heard them arriving in the captain's conning-tower. The commandant

watches the effect of the fire, and changes it from square to square as his judgment may dictate. Meantime he rings the signal bell at stated intervals, and observations are taken, plotted and reported as before, thus correcting the commandant's judgment from time to time by exact information. There being nothing more to see here, we proceed to the headquarters of the outer line of defense.

We find the commander of the outer line of defense and his staff in a conning-tower similar to those already described, and furnished like that of the group commandant. The occasions for an officer of his rank assuming direct control of the batteries would, of course, be rare. Still it might become necessary, in which case the operations already described for the group commandant and his staff, are performed by the commander of the line and his staff, orders to captains being transmitted through the commandants of groups.

In a similar manner the commander of the whole system, both outer and inner lines of defense, could assume control, and direct the fire of every battery in the defenses.

We have now seen the complete organization. To be sure it is an ideal organization, but it is workable. There is nothing complicated about it and nothing in its operations that any common soldier could fail to understand. And it imparts manageability to the defenses. With such an organization commanders would always be able to command, and opportunities like that offered by the *Brooklyn* at Fort Morgan could be taken advantage of without delay.

In a system of artillery defense thus organized and equipped auxiliary defenses would fit in harmoniously. Say a torpedo field closed the channel under the guns of some group of batteries. The commandant of the group should command the field, and provide for its protection. For the latter purpose he would require, in addition to batteries specially adapted for that kind of work, a flotilla of scouting boats, strong, swift and well armed and manned with a view to boarding an enemy. Their armament should consist of machine-guns, and their duty should be to patrol the channels in the vicinity of the enemy, to give timely warning of his approach, and to guard the mine field at all hazards. They are the light cavaly of the defense.

In any attempt upon the mine field the enemy will select a very dark night, or a very foggy day—the latter would be the

more favorable—and he will send forward a number of boats, specially built for the purpose. Their advance ought to be immediately discovered by the scout boats, and their position reported from time to time, as they advance, by means of the steam whistle. Assuming that the channel is buoyed, and the buoys numbered, as the hostile torpedo searchers approached No. 1. buoy, the scout boat would blow one blast on the whistle, as they approached No. 2, two blasts, and so on, and the fire of the batteries would be directed accordingly.

The scout boats would retire slowly as far as the torpedo line, where they would form up ready to charge, ram, or board any hostile boat which may have gotten through. It is madness to assume that any decisive battle can be fought on sea or land without coming to close quarters. The assailant, as a matter of course, will force the fighting. Confusion is his opportunity. His attack on the mine field might, and very likely would be accompanied by a long range attack on the batteries, as was done at Fort Jackson, but he will close in rapidly if his attack on the mine field gives any hopes of success. He will try to confuse the defense, and keep down its fire, and if the commandant loses control of his batteries, he may succeed in forcing a passage without serious injury. But with a machine organized in the way we have sketched, and a well-trained garrison, confusion is hardly possible, unless the commandant gets confused, which, after all, is the way in which battles are frequently lost.

We have attempted to describe the artillery machine with the ideal organization which we advocate, during drill exercise. Let us take a look at it in action.

The enemy has been visible in the offing for several days. He has been reconnoitring our position at long range. We are expecting attack every moment. The scout boats have doubled their vigilance at night and the search lights are busy from darkness to daylight. Soon after dark on a promising night for his enterprise, the enemy advances, slowly and imperceptibly. His ships crawl up like shadows until they are within range—long range of course. Our search lights have rested on him twenty times perhaps since he began to move without detecting the movement. It is not easy to tell by direct observation whether a ship is under way or not at six or eight miles distance. So they get within long range without causing alarm.

At midnight their batteries open, and in a few minutes all the

guns of the defense are manned and all the officers at their posts. The group commandant turns all his search lights on the enemy, and determines the position, course, and speed of his most prominent ship in the manner already described. Meantime all the guns have been loaded. The order then issues from the group commandant "Fire on so and so" and every battery opens on the designated square.

Meantime the enemy has turned all his search lights, forty or fifty of them, perhaps, on our batteries, and we realize in a moment that if we had to depend on visual aiming we should be lost. And now a report comes from one of our base ends "Observation impossible." The enemy has found out its position, and has turned a few search lights on it. From this time forward the judgment of the commandant is our only guide. Fortunately he is able by closely observing the fire to follow his target from square to square with reasonable accuracy.

Meantime a desperate attempt is being made on our torpedo field. The enemy has diagnosed its position correctly, and its destruction is the main object of his attack. He has sent forward a whole fleet of torpedo searchers, under cover of smoke artificially produced for the purpose, and we know of their approach only from the screaming signals of our scouting boats. The batteries whose special duty it is, maintain a steady fire in the direction indicated by the signals, although nothing is visible to them, until the signal cease firing is given. This means either that the torpedo searchers have withdrawn or that the struggle is about to assume another phase.

If rapid fire and machine guns are part of the armament the defense of the torpedo field will be their special care, and the control of the fire can be safely left to battery commanders, guided in some degree by signals from the scouting boats. We cannot enter into the details of this special service in this place. It would require a paper all to itself.

But what transpires at the signal "Cease firing"? Assuming that the hostile torpedo searchers have not retired, but that some of them, perhaps a good many of them, have weathered the storm of iron hail which was so liberally showered upon them, and are getting dangerously near the torpedo field. Our scouting boats have formed up in front of the field, and as soon as the firing ceases in accordance with the signal, charge the enemy. They must destroy him or suffer destruction. It matters not how des-

perate such an assault may seem to be, it must be delivered, without hesitation, even if without hope. The enemy must be rammed, boarded, destroyed in some way. At least these things must be attempted.

This seemingly insignificant battle of the scout boat is *the* battle. The magnificent thundering of the great guns is but an accompaniment. If the scout boats are worsted, the enemy's grand attack may succeed; if they are victorious he must give up the contest. Suppose they are worsted. What then? Why that line of torpedo defense will probably be destroyed, but the end is not yet. The enemy's iron-clads will now advance to close quarters, and his ships will begin to pass the demolished barrier of the torpedo line. Still the crisis of the battle has not yet been reached.

Every well planned modern line of battle, whether composed of troops or fixed batteries, has one important feature in common. The deeper an enemy penetrates into it the more danger he is in until he burst through its last barrier. The enemy having forced the first line now finds himself between the lines. But let us finish the description.

The commander of the whole system of defense has observed the forcing of the first barrier, and now assumes control. He selects his target, determines its position, and directs the fire of the whole system, both first and second line batteries upon it. This second battle between the lines proceeds in the same way as the first one, except that the whole machine is now in operation. The crisis of the battle has been reached, and if the problem of defense was correctly solved the enemy ought to be at a grievous disadvantage. Perhaps he will attempt the second torpedo barrier. Indeed there is no doubt about it. If he did not mean to drive the attack home he never would have thrust himself into such a *cul de sac*. The second torpedo field must be defended in the same way as the first. If the defense is successful the enemy will withdraw. If it fails, the whole defense is a failure.

And here our paper has reached its limit. We have attempted only an outline sketch, avoiding details, and passing by many important departments without notice. Some of these deserve special treatment, and others would require special papers to themselves. We therefore restrict our present notice of them to their names. They are, The Magazine Service, The Position Finding Service, The Torpedo Service, The Scouting-boat Service, and the Rapid Fire and Machine Gun Service.

COURTS-MARTIAL AND CIVILIAN WITNESSES.

By LIEUT. W. P. EVANS, 19TH U. S. INFANTRY.

IN a case which came up some years ago before a court-martial in the Department of Texas, the question arose as to whether or not a civilian witness could be compelled to testify in answer to questions which the court decided were proper for him to answer. On the refusal of such a witness to testify, after having been brought before the court by means of a writ of attachment issued pursuant to Sec. 1202 R. S., the judge-advocate of the court submitted to the War Department the following question: "What remedy has a court-martial in case a witness is brought before it and refuses positively to answer questions which the court decides are proper for him to answer?" The "witness" referred to was a civilian, and the opinion rendered in reply to the question was given on that assumption. In his communication, the judge-advocate of the court referred to the opinion of the Judge-Advocate-General of the Army, given on page 69, Winthrop's Digest, and questioned its soundness. This opinion is as follows: "Held, that a court-martial would not be authorized to punish, as for a contempt, a civilian witness duly summoned and appearing before it, but when put on the stand, declining (without disorder) to testify." The question as raised was referred to the acting Judge-Advocate-General for his opinion, which was given under date of August 27, 1885. This opinion in substance reiterated that given in the Digest, page 69, referred to above. As a result, the contumacious witness was discharged without having given his testimony as directed by the court-martial.

Without presuming to question the correctness of the opinion expressed by the acting Judge-Advocate-General in denying the right of courts-martial to punish for contempt, it is suggested that there may be another remedy than punishment, which the law places at the disposal of judge-advocates of courts-martial in such cases as that referred to above. This possibility does not seem to have been considered in connection with the case, and these suggestions are offered in the hope that they may invite atten-

tion to a construction of the law, which would certainly tend to add to the efficiency of courts-martial in the administration of justice in the Army.

Section 1202 Rev. Stat. being remedial in its nature, let us consider, first: What was the law before this section was enacted? Second: What was the evil against which the law, as it existed previous to the enactment of this statute, did not provide? Third: What remedy did the law-making power provide to meet the evil which existed?

Courts-martial being executive agencies and not a part of the judicial system of the country, have not the powers which inhere in courts of law. Courts-martial have no common law powers, and we must therefore look to the statutes of Congress to determine what authority these courts may exercise. But the statutes conferring authority on courts-martial are not necessarily penal statutes, and should not be construed as such when the purposes for which they are enacted justify a more liberal construction.

As the statutes existed prior to March 3, 1863, the old 76th Article of War (present 86th) seemed to be the only law which gave to courts-martial any authority over civilian witnesses. Under the old 69th Article of War, it was assumed that the judge-advocate of the court as prosecutor for the United States had an implied power to summon witnesses, and his summons might be directed to any person whose testimony was deemed desirable. Military witnesses might be compelled to attend and give their testimony, or render themselves liable to punishment under the old 99th Article of War for "conduct to the prejudice," etc. The summons to a civilian to appear as a witness was merely in the nature of a request, which might be disregarded by him, or not, as he saw fit. The old 76th Article was held to confer authority on a court-martial to punish all persons, even civilians, who should "cause any disorder, or riot, or disturb its proceedings," etc., etc. Whether or not a refusal on the part of a civilian witness to testify could be properly held to be a "disturbance" of the nature referred to in the article, is a question on which it is not known that we have any authoritative decision. The enactment, subsequently, of Sec. 1202 R. S. would seem to deny that such power was conferred by the article or that its existence was at least doubtful. The British court-martial, from which our own were derived, have never exercised nor claimed such power. To sum up, therefore, it would seem that the power to compel a civilian

witness to testify before a court-martial was not one of its inherent powers, was not given it in any article of war, nor was it given expressly or by plain implication in any other statute then existing. Such, in brief, was the law previous to the enactment of Sec. 1202 Rev. Stat., which was approved March 3, 1863.

But when our Civil War had been waged for a year or two and it became necessary to administer justice to hundreds of thousands of our soldiers through the medium of courts-martial, when it became necessary also to extend the jurisdiction of courts-martial over offenses which were ordinarily triable only in the criminal courts or criminal jurisdiction,—it was seen how inadequate were the means of obtaining testimony before courts-martial. In many cases offenders against the law might go unpunished. Justice could not be administered without the presence and testimony of witnesses, and the efficiency of the Army, upon which our national existence then depended, might become seriously impaired. It was important in the interests of discipline that justice should be promptly and effectively administered by military courts to all who came within their jurisdiction. This end could not be attained while military courts could procure only such testimony as witnesses might see fit to give. The evil was not alone that reluctant witnesses refused to be present in obedience to summons. It was that *they refused to appear and testify*. This was the evil to remedy which, Congress deemed it necessary to legislate and confer additional powers on courts-martial. It was the same evil which was referred to by the Cons. Ct. of S. C. in the case of Scott *vs.* Sandifer (Rep. Con. Ct. S. C., 168) in which the Court says: "Besides if witnesses are permitted obstinately to persevere in silence, what case could be tried without some of them persisting in this kind of contumacy? Would it not be placing the justice of the country in the hands of the most abandoned and hardened members of society? * * * This consequence would obviously result, to prevent which, the courts of justice are armed with complete and plenary power, viz.: commitment to the common gaol of the district, there to be kept closely confined until the contempt is purged." The remedy referred to by the Court in this case could be applied only in courts of justice and in those courts in which it was specially authorized by statute.

The evil to be remedied as well as the remedy to be applied seem to be suggested in the decision cited above. The remedy

which the law-making power devised to meet the necessities of the situation is found in Sec. 1202 R. S., enacted March 3, 1863. (It is significant that on the same day, the jurisdiction of courts-martial was extended by the enactment of the present 58th Article of War.) Sec. 1202 is as follows: "Every judge-advovocate of a general court-martial shall have the power to issue like process to compel witnesses to appear and testify which courts of criminal jurisdiction within the State, Territory or district where such court may be ordered to sit, may lawfully issue."

The phraseology of the statute seems very clear. The intention of the law-making power seems equally clear, viz.: to afford a remedy for the evil resulting from the refusal of a civilian witness "to appear and testify." A construction, by virtue of which, a contumacious witness is discharged on his refusal to obey the mandate of the court to testify, renders the law a nullity. Such a construction would seem utterly inadmissible, as being at variance with the principles upon which all judicial construction should be based. In the case of Seamans *vs.* Duryea, (II. N. Y., 238) in which the right of a surrogate court to resort to compulsory process to cause a guardian to settle with his ward is in question, the Superior Court of New York, says: "It was the intent of the Legislature in conferring this jurisdiction upon surrogates, to provide an inexpensive and summary process for the settlement. * * * In other words, for all the purposes of settling accounts between guardians and wards, the surrogate court was invested with all the jurisdiction which had before been exercised by the court of chancery, * * * and while the surrogate courts can only exercise the jurisdiction expressly conferred upon them, the statute, being remedial for the advancement of justice, should receive favorable construction and such as will give it the force and efficiency intended by the Legislature." In the construction of Sec. 1202, which has imposed upon courts-martial their present lame procedure with respect to contumacious witnesses, has the law received such "favorable construction" as to give it "the force and efficiency intended by the legislature"? Has not the construction referred to rather tended to make the remedy of no effect and to deprive courts-martial of the authority which the law-making power manifestly intended to confer upon them? The only real question which seems to present itself for determination is, what "process" may be lawfully resorted to by the courts of criminal jurisdiction in

the State, Territory or district where the court-martial may be ordered to sit? Whatever "process" is found to be at the disposal of such courts is also at the service of courts-martial through their judge-advocates.

The "courts of criminal jurisdiction" referred to in the statute cited above, are the United States courts and the various State courts;—the territorial courts and the courts of the District of Columbia being included in the former class.

It may therefore be said that courts-martial may have recourse to the same "process," for the purpose mentioned in the statute, as may be resorted to by any of the courts mentioned above, in the exercise of their criminal jurisdiction in the State, Territory, or district, where the court-martial may be ordered to sit.

"Process" is defined by Bouvier to be:

"(a) The method of compelling a witness to appear in court."

"(b) The method taken by law to compel a compliance with the original writ or commands of the court."

The subpœna, as well as the writ of attachment would come under definition (a), being the "process" authorized by law to compel the attendance of the witness in court. In the subpœna to a witness, he is commanded to "appear and testify." If, after being duly summoned, he refuses compliance with the writ, the court-martial must have recourse to other process to compel obedience to its mandates. A writ of attachment issues from the judge-advocate, under which, the unwilling witness may be arrested and forcibly brought into the presence of the court.

The writ of attachment does not issue because it is specifically described in the statute. It issues because it is the "process" to which the "courts of criminal jurisdiction," referred to in the statute, resort in such cases. So far, the practice of courts-martial is in conformity with that of the courts mentioned in the statute. But under the present ruling, the power of a judge-advocate to obtain testimony from a contumacious witness ceases with the issue of a writ of attachment. Unless this officer possesses by law the power to compel a witness to testify, it must be absurd to suppose that a witness who refused to appear in court except when brought there by force would voluntarily give evidence to the court after having been brought into its presence. Under such circumstances, if the judge-advocate can resort to no other process than a writ of attachment, the law is in effect a nullity, as the purpose for which the unwilling witness is brought into court

is as far from being attained as ever. True, there may be no limit in law to the number of times a writ of attachment may issue against the contumacious witness, and repeated arrests made under such process might amount to a virtual detention of the witness in custody. This, however, would be vexatious and would be accomplishing by indirection that which, it is thought, the law authorizes to be done directly.

In civil courts of criminal jurisdiction, it is said that if a witness be competent and the questions asked him be pertinent to the issue, he should be compelled to answer. (Ragland *vs.* Wickshare, 4 J. J. Marsh, Ky., 530.) If he perseveres in silence, he may be confined until he does answer. (Scott *vs.* Sandifer, 2 Rep. Con. Ct., S. C., 167.) If the witness is to be compelled to answer by what "process" shall he be compelled? By confinement until he does answer, say the courts. "But," it is claimed, "such confinement is a punishment for contempt, and to punish for contempt is not a power which may be exercised by courts-martial." An examination into the nature of this commitment will, it is thought, show that it is not a "punishment" in a sense which prohibits courts-martial from resorting to it. It is rather a compulsory process, and no more a punishment than is the arrest under the process of a writ of attachment. That a warrant of commitment is a "process" is indicated by reference to it as such in numerous decisions of Federal and of State courts (*ex parte* Bollman *vs.* Swartwout, 4 Cranch, 96; Seaman *vs.* Duryea, 11 N. Y. 324). See also, Justice Nelson's charge to the Grand Jury, U. S. C. C., S. D., N. Y., April, 1851, Gormley's case, XII., Att'y Gen'l, 272–3.

A warrant of commitment would seem to have a two-fold aspect. It may be resorted to in punishment of a witness for contempt. As such, its use would not seem to be authorized to courts-martial. In its other aspect it seems to be a compulsory process. When commitment is resorted to as a punishment, sentence must be pronounced by the court and the confinement must be for a definite period. (People *vs.* Pirfenbrink, 96 Ill., 68; Whittem *vs.* the State, 36 Ind., 196; Matter of Hammel, 9 R. I., 248; Yates *vs.* the People, 6 Johns., N. Y., 337.)

In the same cases, it is shown that when commitment is ordered until further orders *as a punishment* and not *as an aid in the enforcement of a previous order*, such commitment is illegal. By plain implication, therefore, commitment until the offender com-

plies with a previous order of the court is authorized. In fact, commitments of this nature are common in both Federal and State courts, the exercise of the power being expressly authorized by statute in many of the States. It would therefore seem that the confinement of a contumacious witness until he complies with the mandate of the court, is a "process" within the meaning of Sec. 1202 R. S., and being authorized as a compulsory process in our courts of criminal jurisdiction and being frequently resorted to by them in their practice, it may also be exercised on behalf of courts-martial by their judge-advocates. Under this construction of the law, instead of having at their disposal but one kind of process against a contumacious witness, viz.; a writ of attachment—insufficient in itself to remedy in the slightest degree the evil which led to the enactment of the statute—courts-martial may exercise the authority conferred, by means of two kinds of process, viz.: by writ of attachment to compel a witness to appear in court, and by a warrant of commitment to compel him to testify. Under this construction of the statute, its words are fraught with meaning and instead of being a dead letter, a mere nullity, the enactment would seem to be legally sufficient to attain the end for which it was passed. A witness who refuses to appear, after having been duly summoned, is arrested under a writ of attachment and brought into the presence of the court. If he then refuses to testify, he should stand committed at the instance of the judge-advocate until he is reduced to obedience, or until the power which commits him ceases to have official existence as such.

The place of commitment and the person by whom a witness shall be held are indicated by the 67th Article of War.

In arriving at the conclusion upon which the present practice of courts-martial with respect to contumacious witnesses is based, much stress seems to have been laid on the interpretation of the law which governs British courts-martial in their relations with civilian witnesses. When the decisions of British courts are given with reference to common law rights, or with reference to a law which may have been adopted by us, showing how such law was construed and understood by British courts before becoming part of our own law, these decisions are authority for our guidance and have binding effect upon our courts. (12 Peters, 527.)

But decisions by British courts with reference to a law, rendered subsequent to its adoption by us, are not binding upon us

(5 Peters, 280), much less would the decisions or practice of British tribunals be of any weight as showing what are the powers of our military courts or of our judge-advocates, when such powers are derived, not from custom, but from a statute which was enacted nearly a century after our separation from the mother country, and which was brought into existence by our own peculiar necessities and not by adoption from British law, in which nothing analogous is found.

British courts-martial cannot even compel the attendance of a civilian witness except through the medium of a civil court or magistrate. (Army Act, 1881, par. I (a).)

No such instrument as a writ of attachment is known to the practice of their military courts. Nor can their military courts compel a witness to testify, nor to be sworn, nor to produce any document in evidence before the court, except through the instrumentality of a civil court, to which the offense of contumacy in any of these particulars must be certified under the hand of the president of the court-martial. (Army Act, 1881, par. I, b.)

Even in the presence of a court-martial a person not subject to military law, "who is guilty of any contempt towards it, by using insulting or threatening language towards it or by causing any interruption or disturbance in its proceedings," etc., etc., cannot be punished by the court against which he offends, but must be taken before a civil magistrate for punishment. (Army Act, 1881, sec. 126, par. 4.)

Many of our Articles of War and statutes relating to the Army are peculiarly our own, and with their interpretation the decisions and practice of British tribunals have nothing to do. Sec. 1202 Rev. Stat. is one of these enactments. Under British laws their military courts look to the civil courts for means of enforcing their decrees. Under present rulings our own courts-martial seem reduced to the pitiable state of being unable to help themselves and of having no help to look for from others. Such could not have been the intention of the framers of the law. What is provided for in one way in British law is, in our own law, provided for in quite another and perhaps more effective way, and with equal security to the rights of the citizen. When it was claimed that the statute under consideration might prove of no effect because no person was named in it to whom the writ of attachment should be directed, it was held by the Attorney-General of the

United States, (XII, 502,) that such a contention arose from a too narrow construction of the statute.

Does not the present helpless condition of our courts-martial, when their mandates are defied by a contumacious civilian witness, arise from the same cause?

Comment and Criticism.

(The remarks under this head have, generally, been invited by the Publication Committee, which desires that, as far as practicable, these "Comments" should appear under authors' names.)

I.

"Centralization and Decentralization in Army Affairs." *

Major-General O. O. Howard, U. S. A.

EDITOR JOURNAL M. S. I., *Dear Sir:* You write that the Publication Committee invites my comments upon Lieut.-Colonel Lee's article on "Centralization and Decentralization in Army Affairs."

It happens that for the next three months, my essential and accepted work is almost too much for me, so that I cannot give to the article the time that its importance demands.

However, my first thought on reading it is, that Lieut.-Col. Lee has written an excellent article, a suggestive paper, upon a subject that must very soon demand the attention not only of the Executive but of Congress.

The principle that "no man can serve two masters," meaning, of course, two wills acting independently, is not only a saying of the Great Master, but one said by him as a plain axiom not to be disputed.

If there be the centralization of all the power touching the quartermaster's department in the quartermaster general; and touching the commissary department in the commissary general; the medical department, already almost accomplished, in the surgeon general; all in the engineers corps, in the chief of engineers; and in the ordnance corps in the chief of ordnance, there is but little of administrative authority left for the General of the Army, or for the heads of geographical divisions by this system, when in practical operation.

The chief quartermaster of a division, for example, is made fearfully uncomfortable by being obliged to obey his division general near at hand, and at the same time, the quartermaster general at Washington. It is something impossible for him to do the instant there is the least conflict of orders; a conflict that nothing short of Divine control can avoid.

In times of peace we hitch along as best we can. The head of a geographical division, usually a general or colonel, by taking his permanent chiefs of staff for counsellors and obeying the laws and regulations according to *their* views and the decisions of *their respective bureaus*, if he have abundant experience, will manage to execute his duty from day to day, maintaining a reasonable degree of harmony. Certainly the simple statement will show that this is not the best way, and this is not the practical method of administration that must be adopted the instant war or active operations of any kind are set on foot.

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* Colonel Lee's article upon Centralization and Decentralization in Army Affairs was read before the Vancouver Barracks Branch of the M. S. I., on the 5th day of April, 1891. This announcement was inadvertently omitted when the article was printed.

It has been the tendency in all countries for army and navy organizations, in times of peace, to gravitate towards the multitudinous control of bureaus, so much so that the name "Bureaucracy" is a condensed expression for management under these divided powers.

It is human nature for each head of bureau to magnify his own importance; to seize the citadel of power, so far as his own division of labor is concerned, and to so intrench himself that the commander of the Army, the commander of the geographical divisions and departments, cannot successfully attack or carry his stronghold.

As my brain seems to be put together, I cannot help thinking, that, for best efficiency, the Admiral of the Navy should be able and fit to hold the central control of all naval matters, under the Executive and his secretary, and that the General of the Army should exercise a corresponding office in the Army. Both secretaries would then be foot-loose, and not hampered by an enormous detail of business of trifling concern—free to go and come; to see everything and so be most thoroughly furnished as advisors of the President, and executors of his will. This order of things would bring every bureau into subordination and under the command and will of the commander of the Army. He, through his subordinate commanders, who, of course, would be trusted with much larger measures of authority than now, could then make an economic, thorough and efficient administration of all matters committed to the Army. And, in like manner, the Admiral of the Navy would unify and effectually administer the affairs of the Navy. Such, in brief, is my view of a proper organization.

As to how to effect such a radical change; it would be, of course, necessary for the Executive to see the matter in this light; to propose it to Congress; then, for Congress to take it under most careful advisement, committing the codifying or revision of all laws concerning the Army or Navy to the best legal and judicial talent in the land; then, as soon as the laws were promulgated, we might begin with a clean page, making as few regulations as possible; so that it would be a long time before the foolish practices of restraining people from wrong doing by volume upon volume of rules and orders would be again attempted.

Under present laws, regulations or orders, doubtless the present generation of officers are doing the best they can.

If a bureau-head is held to a large responsibility, he naturally seeks all the authority that he can get, so that the changes suggested by Lieut.-Colonel Lee could not very well be effected without wiping out everything that is on the slate and commencing the whole statement of laws, regulations and orders *de novo*.

Perhaps it would be essential indeed for our sovereigns, that is, our thinking people, to see the operations of law and the matters of administration and organization in the same light as those honest, patriotic, hard-working officers who are proposing changes, see them.

II.

"Artillery Difficulties in the Next War."

Lieut. G. N. Whistler, 5th Artillery.

THE opening of Captain Chester's article under the above caption in the last number of the JOURNAL was exceedingly interesting, and led me to expect a valuable paper upon the subject of a proper harbor defense.

His citations from the occurrences of the late war were very valuable, and I continued the perusal of the article with great interest; imagine, therefore, my surprise in finding that it was all merely a prelude to a tirade against modern methods in artillery practice and instruction in our service, and also against the use of instruments of precision in artillery practice.

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As I was among the first to advocate the new method, and have probably had more experience in its practice and in the use of artillery instruments of precision than most of my brother officers, I take the liberty of replying to Captain Chester's article.

However *apropos* Captain Chester's citations may be to the subject of harbor defense, they are not at all applicable to the question at issue, that is, the use of instruments of precision in artillery warfare. To use telescopic sights, at distances where the naked eye and open sights were ample for all purposes, would have been useless even with a modern armament. The use of verniers reading to one minute, at ranges where five minutes would not vary the height of the trajectory two feet, would be absurd; and the use of anemometers at distances where a hurricane would not blow the shot off of the vessel fired at, would be folly. It does not follow, however, that because instruments of precision are a detriment and a hindrance at ranges where they are not necessary, they are therefore valueless under all other conditions.

Captain Chester makes a very strong point in favor of concentrated volley-firing in harbor defense. While I heartily agree with the Captain as to the value of this kind of fire in its proper place, and at the proper time, I cannot agree with him, that it will supersede entirely individual gunnery, and I consider that it would be a grave mistake to neglect individual gunnery practice in our artillery instructions.

I can probably best present my views on the subject by assuming an hypothetical case of actual warfare.

Primarily, I am in full accord with the Captain in his ideas concerning the uselessness of an artillery defense alone against a modern steam navy. The necessity for a proper system of obstructions is beyond question; in fact, I was not aware that there was any doubt upon the subject, nor that there was any difference of opinion upon this question among modern artillerists until I read Captain Chester's paper.

Let us now assume a defense of New York Harbor. For the purpose of simplifying the matter, we will ignore the defenses on Sandy Hook, or consider them in the hands of the enemy. Assume the fleet to have entered the lower bay, and to be preparing for an attempt to "run by" the fortifications at the Narrows; and as the question at issue only refers to gunnery practice, I will ignore mortar practice, or the use of any system of aerial torpedoes.

We must, of course, assume that the enemy's fleet is of sufficient strength to warrant an attempt to make the assault; it will, therefore, probably consist of battleships, cruisers, torpedo boats and other vessels suited to removing obstructions.

As the first stage of the assault necessarily involves an attempt to remove a thoroughly defended system of obstructions, it is manifest that the first stage of the artillery battle will be an attempt upon the part of the fleet to silence the guns of Hamilton and Wadsworth, at least sufficiently to admit of the effort to remove the obstructions. It will, I think, be conceded, that should they succeed in silencing the works sufficiently to enable them to remove the obstructions, the "run by" is a foregone conclusion.

If they fail in this attempt, victory perches upon the standards of the defense. This, therefore, is the most important stage of the battle, and I propose to show that in this stage individual gunnery practice will be far more important than concentrated volley-firing, and that the use of instruments of precision will be an absolute necessity with a modern armament.

A considerable discussion has been maintained as to whether, under such circumstances, the fleet would come to anchor during the bombardment or continue in motion. Whatever may obtain in an open sea-way, it is manifest that in the case under consideration, both plans would be adopted; the light-draught cruisers would probably continue in motion to the extent permissible by the depths of water, and the character

of the torpedo obstruction. The battle-ships and large armored cruisers must necessarily anchor to avoid grounding on the flats.

The range of modern guns would permit the enemy to remain at a distance measured by the efficiency of their own armament; while this would be less than the range of the fortifications, it would certainly not be less than 5000 yards.

At this range the fleet will have a decided advantage in consequence of the greater size of the target at which they are firing, whereas the army will have an advantage due to the rigidity of the platform from which they are firing.

It is to be noted, however, that the navy has the advantage of considerable latitude in the accuracy of the training of its guns, whereas the army would lose all the advantage gained by its solid platform, unless this be utilized to obtain more accurate results.

At this stage of the action, I opine that the individual gunnery practice will be found to be much more efficient than concentrated volley-firing. It is true that the use of volleys against such vessels as may attempt to remove obstructions may proye valuable, but the main reply to the bombardment will be by the fire of carefully trained single guns.

Whatever may be the character of the fire, it is manifest that in order to utilize the advantage of the position, the maximum accuracy must be obtained. In order to insure the requisite accuracy in single gun fire, telescopic sights must be used.

This may be demonstrated as follows: Experience has shown that, even with the fine sight of the small arm, four inches per hundred yards is the smallest point which can be aimed at with accuracy with an open sight, or possibly three feet per thousand yards. This will be equivalent to fifteen feet at a range of five thousand yards, and with the coarse sights of a heavy gun, it will be found that, at ranges of five thousand yards and over, thirty feet is about the minimum width that can be covered with accuracy with an ordinary open sight. In this connection it should be remembered that a vessel of fifty feet beam, head on, subtends a visual angle of 0° 10′, and therefore that a front sight three-tenths of an inch wide would hide the vessel from view.

At these ranges, the use of verniers reading to minutes, is absolutely necessary in giving elevations. The best that the unassisted eye can do, is to distinguish quarter degrees, on open sights, of any reasonable dimensions; and the variation of a quarter of a degree in elevation, at five thousand yards, means a difference in range of two hundred yards and over.

It is to be noted that this is equally true whether the battle is to be fought by individual gunnery practice or by volleys.

At five thousand yards and over, a very ordinary wind would deflect a shot sufficiently to miss a vessel head on, nor would it require a very strong rear wind to lift a shot entirely over a modern iron-clad. Therefore, if accurate work is to be done, some method must be devised for ascertaining the force of the wind, hence an anemometer of some kind must be used. I would again call attention to the fact that these remarks are as applicable to volleys as to single gun practice.

It is fortunate that at this stage of the battle, where accuracy is so important, we have ample time to use these instruments of precision; and furthermore, as the enemy approach so closely that these instruments cannot be used with facility, they become of less and less importance, until finally they would only be a hindrance to rapid and accurate work.

Of course a paper of this kind does not admit of going into much detail. I wish to state, however, that I am entirely in sympathy with Captain Chester's views as to the advantage of concentrated fire under the control of the captain, and have on another occasion placed myself officially on record, that I considered his plan the best that had been yet devised for the purpose. But whatever system may be adopted, the

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necessity for accurate and careful work, whether to be done by aiming or by some automatic predetermined plan, will necessitate the use of instruments of precision and that by the individual gunners.

At the stage we are now considering, whether the guns are to be directed singly, at stationary or moving vessels, or are to be massed in volleys to repel the effort of some venturesome cruiser in an attempt to remove obstructions, the extreme range will necessitate the careful and the accurate work of the individual gunner.

Let us now pass to the second stage of the battle; that is, when the obstructions have been sufficiently removed or the channels sufficiently reconnoitred to admit of the advance of the fleet.

During this stage I freely admit that the volley system is decidedly the more preferable one to employ; but even then, so long as the range to the fleet exceeds 3000 yards, the instruments of precision cannot be entirely discarded. At three thousand yards and under, open sight work, on some predetermined automatic system of training guns, must be used. Whichever plan is adopted for pointing, the firing of the guns by concentrated volleys under control of the captain, is beyond question the better method.

In considering the third stage of the fight, that is, the "run by," it may be predicated that, with the way cleared of obstructions, it is impossible with artillery fire to prevent a fleet of modern iron-clads from running by a battery.

In the present case it is not assumed that the way is clear, but that the fleet has advanced sufficiently to warrant the naval commander in attempting to force the passage by sacrificing one or two of his vessels. How is such an attempt to be met? Unquestionably, by concentrated volleys, fired at point-blank range, upon predetermined lines of fire, the guns to be discharged by the captain at the instant the vessels cross the line.

Without, therefore, considering details, we may classify the fire as follows:

First stage. Long range; individual gunnery practice, using every practicable scientific appliance in order to obtain the maximum efficiency and accuracy of work. Volley firing will, of course, be used in this stage whenever necessary, either to repel an attempt of the lighter draught vessels to remove obstructions, or, in case where the individual practice has accurately determined the range, it is deemed wise to attempt to crush an anchored vessel by a single well directed volley. Ammunition should not, however, be wasted in this stage of the fight by volley firing, unless there is reasonable certainty of hitting the object fired at.

Second stage. Mid-range. During this stage of the fight concentrated volley firing should be employed altogether, unless, possibly, in exceptional cases, neglecting, however, no available means of insuring accurate work.

Third stage. At close quarters. In this stage, as the firing will be probably altogether on predetermined fixed lines of fire, and at short ranges, where atmospheric conditions produce but slight variation, instruments of precision will be discarded and good judgment and common sense substituted therefor. Some fixed devices will of course be used to insure obtaining the correct direction and elevation, requisite to cover a predetermined line or point. I would, however, suggest something more accurate than a chalk mark on the trunnion or traverse circle, which was such a favorite device of the old-school artillerists.

I have thus, without entering too much into detail, attempted to demonstrate, first, that individual artillery practice is not altogether a thing of the past in modern warfare, and, second, that in order to obtain the maximum efficiency from modern guns, we must utilize all known scientific methods that are not too cumbersome or complicated for conditions of actual warfare.

It may be stated in reply, that while I do not advocate the use of instruments of precision at the shorter ranges, I have, myself, in common with others, used them at ranges of 1700 and 2000 yards. This is true, but it should be remembered that under these circumstances we were firing at targets only ten or twelve feet wide, and not at war-ships. Practice at 1700 yards, at a target twelve feet wide, is equivalent to firing at a vessel of sixty feet beam 8000 yards away.

This naturally brings us to the subject of the instruction of gunners, and I maintain that the instruction of prime importance is the correct and accurate use of such instruments of precision as may be placed in their hands.

The only practical means of imparting this kind of instruction, is by the use of the instruments in a manner which will clearly indicate the accuracy or inaccuracy of their work. No better plan can be devised than to measure the result of their work at the other end of the range. I therefore maintain, that our gunners should be accurately and carefully instructed in individual target practice, with the use of all available instruments of precision. Targets should be made proportional to the objects to be fired at in actual warfare; thus, if a gun is being used with which the gunner ought to be able to hit a vessel of sixty feet beam, head on, 6000 yards away, heishould be required to practice at a target twenty feet wide at 2000 yards range, or one ten feet wide at 1000 yards range; and nothing but a hit should be deemed satisfactory practice. Of course I am considering my target a vertical plane of the prescribed width, and of a height which will be equivalent to hitting any part of the deck.

However, this is no place for the discussion of the details of artillery instruction, my object being merely to reply to the points raised by Capt. Chester.

I do not wish to be understood as not advocating a systematic instruction in concentrated fire, or the practice of training guns by automatic methods; I simply maintain that this method of instruction should follow that of individual practice.

It should be remembered that it is more properly instructive for the officer than for the gunner, and that unless the gunner is well instructed in individual practice and the use of instruments, the volley work of the officer is very apt to prove a failure.

As yet, no satisfactory system for concentrated artillery practice has been devised; and this subject, together with a discussion as to the best method of harbor defense, is so exceedingly important, that I would, in conclusion, recommend that the Military Service Institute select for the next Prize Essay, the subject of the Artillery Problem of Harbor Defense. If such a subject be deemed too technical, or too special for the annual prize essay, I would suggest the offer of a special medal for an Artillery Paper upon this subject.

III.

"Range and Position Finding."

Lieut. A. D. Schenck, 2d Artillery, U. S. A.

UNDER the assumption of a speed of ten knots for an enemy's vessel, Captain Zalinski has, of course, found no difficulty in demonstrating the want of practical value in the system of squares for range and position finding. He finally concludes that a proper system must fulfill ten conditions which he enumerates, asserting that they "can only be fulfilled by an automatic indicating system giving polar coördinates."

For the sake of the argument this may readily be granted, and further, that the system he indicates can be easily and accurately applied in service by human agencies. But even though a 100-ton could be fired from the shoulder with the rapidity and ease of a 6-pounder, rapid-fire gun, what would be the value of this system,—under the condition of ten knots speed,—even if it could be properly applied?

It must first be premised that if the enemy can make ten knots, he can and assuredly will make at least sixteen; the speed used indicating that he has reached Farragut's conclusion to "Damn the torpedoes! Go ahead."

As for the channel, take for instance, our most important one, leading into the lower harbor of New York. The leading officer of the enemy, having at his side a captain of one of the numerous foreign steamers constantly passing through this channel and as familiar with it as any pilot, would not, were ten knots otherwise assured, require much courage to "Damn the channel! Go ahead." If he can really attain a speed of ten knots, it would not require much nerve to put his vessel or fleet to it, and, in so far as respects any purely artillery defenses yet designed, he could as readily and quite as safely pass them as did Farragut those at the mouth of the Mississippi, or at Mobile. To meet an attack successfully under such conditions of speed with an artillery defense, would necessitate not only an extraordinary number of the most powerful guns, but the further condition that each gun shall be capable of being fired with the facility and rapidity of a quick-fire gun, and without smoke. For we could be assured that an enemy's fleet passing our defenses through a channel and at such speed, would fire no guns save those using smokeless powder; that not at hand, he would depend upon speed alone to assure success.

The advantages of such a measure of mobility are so preponderating over any probable artillery fire alone as a measure of defense, as to insure the success of the assailant almost beyond the peradventure of a doubt, and the fulfillment of all the captain's ten conditions as to range finding, etc., would not affect the result in any appreciable degree.

The trouble lies in the fact that he has entirely ignored every one of the essential conditions of attack and defense. These must first be stated with reasonable accuracy, and only upon the resulting limitations can the value of this or that system of range finding be predicated. There is an old saw that "It is only the poor workman who finds fault with his tools." We certainly should have the very best tools in the market, and a good instrument or system for range finding is unquestionably one of the most necessary and useful an artilleryman can possibly have, and whichever system gives the best practical results under anything like actual service conditions we will get without trouble. But in order to prove the superiority of one instrument or system over another, it is not permissible to assume a condition which is not anywhere claimed or conceded to be possible, and which, if it were possible, would inevitably prove not only that all such instruments have no practical value in actual service, but also our whole system of artillery defense to be worthless as well.

Lieut. C. L. Best, Jr., 1st Artillery.

In the JOURNAL for July, Captain Zalinski discusses an artillery question of the first importance. In time we hope for a complete modern equipment, and in the meantime we should have fully prepared ourselves to do the equipment justice.

The writer concurs with Captain Zalinski in the belief that batteries cannot be satisfactorily fought if reliance is to be confined to a "central station." In the future seaport battle the best, or even fairly good results cannot be attained from shore except through observing stations commensurate in number with the extent of the armament. The nearest stations, including that of the commanding officer, should be located so far from the flank that no smoke curtain from the batteries will lie between them and the hostile ships.

For each group of guns there should be two stations, the principal of each set containing, besides the observer, three persons and plotting board; the other station an observer and an assistant. These stations should be armored, and have their floors so far below ground that the aperture for the telescope would be but a foot or two above

the surface, which, ordinarily, would bring the horizontal plane of view sufficiently high above water. These stations, painted above ground in keeping with surrounding color, would be invisible to the enemy. The further stations for this post (Fort Hamilton) would lie in the direction of Coney Island, and be two miles or so away. Were all the stations aligned, *i. e.*, not grouped in any way, and of the height and color suggested, the probability of one being struck would be small, even were the enemy to seek them to the neglect of the works.

Each of the principal observing stations would, of course, be connected with its secondary station, the commanding officer's station, and with its group of guns; the connections should lie in a strong conduit well below ground.

Assuming for this post fifteen groups of guns (each group to be of the same calibre) and a battery of sixteen mortars, the range and position finding would require thirty-two stations besides that of the commanding officer, and a complement of some 100 men, or less than two per piece.

The arrangement suggested would require money, no doubt, yet the cost would be but the fraction of that of a single battle ship.

In his criticism of the square system, Captain Zalinski shows a section of map and in connection with it says: "It is assumed that the system of squares may be used in connection with the simple range-finding system. The range being found by ordinary range-finding devices, and the number of the square being ascertained, this number is to be telegraphed to each battery. After this telegram is received, the number of the square must be referred to a table, and the corresponding range and azimuth-angle must be ascertained therefrom. After this the gun may be laid. But this does not give the information necessary for making allowance in changes of range, or direction, or both, which occur during the time of flight. A chart must be at hand, and the course of the ship may be plotted; but even with this, unless the speed of the moving target is also telegraphed, it is not possible to draw any correct conclusions at the firing point, as to the allowances to be made in range and deflection for the movement of the target. The moment when the firing is to take place must then also be determined and acted upon at the observing station.

As the gun is pointed at the centre of a square (presumably of one hundred yards side), the point aimed and fired at may be fifty yards from the position of the target, as it may not choose to pass through the centre. Even if smaller squares are used, the target may still be some distance from the point aimed at. Examination of the diagram in Fig. 1* will show some of the difficulties and errors which are likely to occur by using the system of squares. The full line shows the course of the vessel. The dotted lines to the centres of the squares are the ones which the commander of the battery would make, if he plotted by the number of the squares telegraphed to him from the observing station. It is clear that information of this character will not suffice to give him a correct idea of the relative direction of movement of the enemy, nor from it can he even approximate to the speed of the target. The speed may be given from the observing station. But as will be seen in the diagram, a direction of movement may be assumed, from the squares signalled and plotted, of at least 45° with the true movement."

Now to the writer's mind the affair should be differently managed. Why should the battery (group) commander have a chart at hand on which to plot the course of the ship, or know its speed, or be bothered in plotting, perhaps, a direction of movement 45° with the true movement? If his mind were to be occupied with all these things, his perplexities would certainly constitute a convincing array of objections to the

* See page 765, JOURNAL M. S. I., No. 52.

square system. Why not allow the group commander to "press the button," and the group stations to do the rest, so to speak?

Assume stations for a post as suggested. To the principal station A, (to which B is the secondary station) of group C, the commanding officer sends word to attack such a vessel. A knows that C is loaded, a part of each detachment standing ready to traverse and a part to elevate.

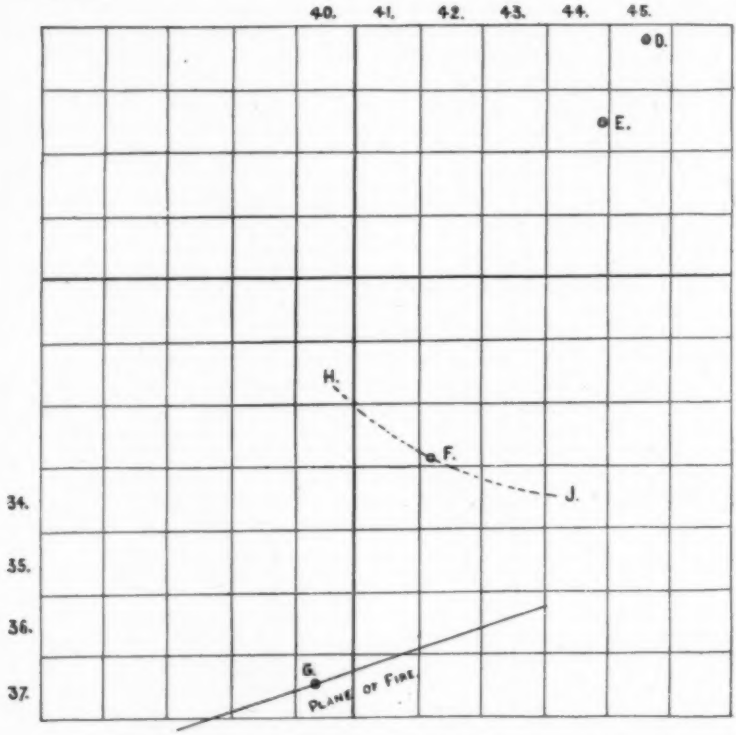
The range table, one of which should be at A, and a duplicate at C (one at each gun in C if the group fire is to be concentrated on a single point, instead of in parallel planes) should be in pamphlet form (top numbers to show marginally), thus being in handy shape, and in best form to show at once the desired data. The following shows a page of such a pamphlet:

8-INCH RIFLE, NO. 15. TOP NUMBER, 40.

Side Nos.	Azimuths (corrected for Drift), and Elevations (Quadrant)		Ranges and values of 1′ for corrections for Wind. Yds.	Flights. Seconds.	Side Nos.	Azimuths (corrected for Drift), and Elevations (Quadrant).		Ranges and values of 1′ for corrections for wind. Yds.	Flights. Seconds.	
	°	′			27	° 38 4	′ 22 18	2701 2/3	7	
					28	39 4	44 06	2624 2/3	7	
					29	41 3	10 55	2548 2/3	6	
					30	42 3	42 45	2474 2/3	6	
					31	44 3	21 35	2401 2/3	6	
19	29 6	47 12	3365 1	9	32	46 3	04 25	2331 2/3	6	
20	30 5	41 46	3278 1	9	33	47 3	54 18	2263 2/3	6	
21	31 5	36 33	3193 1	8	34	49 3	51 09	2198 1/2	5	
22	32 5	34 18	3108 1	8	35	51 3	55 00	2135 1/2	5	39 and 40
23	33 5	37 06	3025 1	8	36	54 2	05 52	2075 1/2	5	
24	34 4	43 55	2942 1	8	37	56 2	24 43	2018 1/2	5	
25	35 4	52 42	2860 1	7	38	58 2	50 37	1964 1/2	5	
26	37 4	04 30	2781 1	7	39	61 2	24 30	1915 1/2	5	

The time necessary for C to be directed and elevated would be known. A little recent experimenting here as to this leaves no doubt that an 8-inch rifle can be ready for firing in twenty seconds after receipt of signal.*

Assume, as an illustration of what follows, that something less than three minutes will suffice from the instant a vessel's course is first fixed until the group is fired. Just what time may be found as the smallest safe limit, experiment and practice can alone determine.



The vessel to be located is agreed upon between A and B, and at given signals twenty seconds† apart, the ship is angled at D and E. Within twenty seconds after passing E on the water, the ship should be shown by dots at D and E on the map. Apply short legs of proportional dividers (long legs : short ditto : : 4, say, : 1) to D and E ; reverse dividers, foot of long leg on E, the other at F in prolongation of D E.

Thus (at F) is located the point where ship will be (if she keep her course and speed) eighty seconds after passing E.

To locate G (the centre of some square 400 to 600 yards from F)—send word—40.

* The 15 inch gun was (with trunnion device for elevation) directed and elevated in eighteen seconds including the time of command, and the elevation afterwards changed in eleven seconds. All this was done with probably not more than ten minutes previous practice, all told.

† Warning bells ringing automatically.

37—from A to C,—and direct C for G,*—should occupy not over seventy seconds after vessel has passed E. At that moment the vessel, if its speed were uniform, would be somewhere short of curve HJ.

In the meantime observations are continuing every twenty seconds. If the ship continue on to G, the plotting room station indicates to C the moment to fire. Should the observation show a change of course or speed, or both, A indicates to C a new elevation to take, and, at the proper instant before the ship passes into plane of fire, sends word for the salvo to be fired.

The method is somewhat complex in explanation, and how much less so it may be in application after practice can only be known after such practice.

Briefly, then, the idea is to establish as quickly as possible a point in the harbor through which the plane of fire will pass, such point to be so far (within reasonable limit) in advance of the ship that there will be ample time in which, by keeping track of the ship at short intervals, to so alter elevation, if necessary, that the ship will be struck as she passes through the plane of fire; and all this to be done without exposing a man at the guns to machine-gun fire.

The "reasonable limit" must be determined by the least safe working *time* after first locating the ship and direction of course. Such time limit being determined by practice, the proportional dividers would establish the proper plane of fire whatever the speed.

In the 8-inch range table (from Tidball) given, doubtless the ranges would not correspond with their elevations, an important matter. Powder deteriorates, but let it be as much the duty of artillery officers to determine from time to time regarding their powder, correcting their range tables accordingly, as it is for railway authorities and steamboat inspectors to test periodically their bridges, hulls and boilers.

Our present system of target practice, blazing away wherever we fire at the same fixed ranges, is faulty in three particulars. 1st. Owing to exact repetition year after year it fails to keep interest alive. 2d. It withholds from the artillerist evidence of what his firing practice might be. 3d. Because of the "comparative figure of merit" idea, secretiveness instead of neighborly assistance is engendered. A system causing emulation is of course to be commended, but not so such a one as makes misers of gunnery successes. The present gunnery practice is so involved in a mass of useless matter that months seem to be required to digest it and publish the results.

Effective sea-coast fire is now beginning to be of such importance to us that ideas on the subject should be presented and discussed and one or more systems, determined on as the most promising, put to the test of trial without delay.

Posts, generally, will not be supplied with even samples of modern guns for some time to come, but to some one favorably situated post one quick-firing gun of medium calibre could soon be supplied. On top of a 15-inch gun the small gun could be rigidly attached, and thus, inexpensively and practically with a heavy gun, experiment could be made in the most important particular of sea-coast firing,—practice at a moving target. By next year all posts could be so equipped and such method and details there followed as experiment may have shown to be the best. Expense, and wear of large rifled guns considered, most of the yearly practice with them will probably be through small guns on or in them.

Anything departing from the way of our fathers comes, to be sure, under the head of "jimcracks," but the days of $15 discharges at sailing ships and trust to God for results, have gone out with the old type of ship. If "jimcracks" seem in peace to

* Direction of plane of fire not to be subsequently changed for that fire unless vessel change her course very considerably in one direction.

promise success, but fail in the critical moment, the old method is always there to fall back on. Will they fail, however? Will they not triumph to the discomfiture of muzzle loading ideas?

Closely allied to the subjects touched upon is a matter worthy of serious consideration.

The heavier guns of the future will have appliances for raising and lowering gun-carriage, ammunition and all, which involves the use of machinery; machine and rapid-fire guns will constitute a part of armaments, and to handle them well requires skill and intelligence; torpedoes, involving electrics, explosives, preservation, care, etc., will become a part of artillery affairs.

It can hardly be questioned that the future artillerymen, to manage as the country has a right to expect all matters with which they will, no doubt, be eventually charged, must be a *highly trained, stable body.**

A certain percentage of this force should be men of considerable intelligence to attain to the necessary technical skill,—men who can signal, telegraph rapidly, construct and repair lines connected with post and inter-post communications, torpedoes, etc., care for and handle generally the torpedo system, train guns skilfully, who have the necessary knowledge of gunnery and explosives, and can triangulate, plot, etc,, etc.,—and the question arises: *Will such a stable body, with necessary percentage as to mental training, ever be evolved from the present rates of pay, where every one below the non-commissioned officer is on a dead low level as to pay, and the non-commissioned officer but a shade above?*

Can first-class non-commissioned officers and competent "first-class gunners" be expected at present rates? Certainly not. While even the sergeant receives but some $30 per month in the way of pay, clothing, subsistence and fuel, the civilian farrier with the light battery here draws $75; the Q. M. D. handy-man employé gets $75, and even the darkey who mows the slopes does it at the rate of $52, although he cannot even sign his name.

To be sure we have qualified a number of paper gunners, a step in the right direction, but the qualifications of the "first-class gunners" (which should be the grade below that of non-commissioned officer, and through which the non-commissioned officer should have passed) are by no means such as should govern were our armament modernized. When the all important time arrive, and our skeleton garrisons are strengthened from the raw people, who is to mould into working shape that part having the necessary intelligence? Surely the handful of regular officers must have competent assistants.

The foot artillery service may be made attractive to those out of it, and one in which those in it would, as a body, be well satisfied to remain, were the pecuniary inducements sufficient. The artillery within itself has the means, were the stimulus not lacking, of bringing to the necessary state in all ways needed material for good non-commissioned officers and "first-class gunners." In these several particulars the one thing lacking is the incentive, to men, of *reasonable pay to reward the acquisition of such common school knowledge as a foundation, and such technical knowledge besides as may be essential.*

For non-commissioned officers there should be the pay of like grades in the Engineers, Ordnance and Signal Corps; for "first-class gunners" first-class pay, etc.; for second-class gunners second-class pay, and for such machinists, etc., as may be found necessary, pay suited to work and qualifications. Classification of first and

* The casualties at this post from one cause or another (besides discharges on account of expiration of service) during the past six months have been fifteen per cent.

second-class gunners would result from examinations as inaugurated this year ; first-class gunnerships being forfeited for cause as may be determined.

To most of the non-commissioned officers as they are now, and to second-class gunners of the future, the incentive of pecuniary reward towards attaining what should be the future "first-class gunner's" qualifications would produce more results in a year from *voluntary* school than an indefinite time under the present system of compulsion and no reward—a system that accomplishes practically nothing.

Lieut. Henry L. Harris, 1st Artillery.

While agreeing with the writer of this article to a certain extent, it occurs to me that he unnecessarily exaggerates the defects of the "Square System," so called, and gives a wrong impression, to any one unfamiliar with the proper working of that system, as to its usefulness when no better one is available.

In the first place, I do not think it was ever intended that the only information sent from the plotting room to the officer in command of a group of guns should be the fact that the vessel against which he is to direct his fire is now in this square and now in that, leaving him to work out his salvation or the enemy's damnation by instinct.

At the risk of being verbose, I will describe what I consider to be the proper application of the "Square System."

The observing stations are or should be connected with the plotting room by telegraph and also by a wire connected with a call bell. The plotting room should be connected by telegraph and speaking tube with each group of guns that is to be operated from it.

The commanding officer or his representative should be at one of the observing stations. He notifies the plotting room to be ready for such a group of guns, and ascertains with certainty from the observer at the other station that he is ready and is sighting on the vessel selected, then signals plotting room to go ahead. Plotting room keeps the time record, gives a preliminary signal (previously agreed upon) on the call bell, and on the second, gives a sharp signal to both observers. The telescopes which have been kept on the vessel are stopped temporarily, the reading taken and transmitted and the telescope again directed upon and kept on the vessel. Plotting room records time and angles and plots position, and again at the expiration of a predetermined interval of time signals the observers, who read and transmit as before, the results being noted and plotted as before.

Three observations will indicate the vessel's course and speed with sufficient exactness. A line from the central gun is laid on the centre of a square to which the course is pointing and sufficiently far ahead of the last position plotted to enable the information to be made of use to the officer in charge of the guns to give the proper direction and elevation, and the time at which the vessel would arrive *at this line* determined ; an assistant in the plotting room, having a chart of squares for the group about to fire, and glancing at the plotting board, sees the square and estimates the distance over or short of its centre of the point of intersection of the vessel's course with the line to the central gun of the group, and sends a message to the gun about as follows : "115° 37′, 6742 yds., 10 h., 43 m., 50 sec." This is practically a system of polar co-ördinates.

The officer in charge of the guns is relieved from the necessity of making calculations amid the noise and confusion inevitable in the working of a battery under fire. He must know his range and deviation table and table of time of flight just as he knows his multiplication table, and must be able to use them as readily.

This system, or any other, to give good results, requires practice. It is the only system we have. Yet if it were to be tested to-day, at almost any artillery post, the

results would probably be far from satisfactory, and this would not be due entirely to the defects of the system.

The objection that the vessel may change her course at any moment applies to any system, and it is doubtful whether it would be greater for this than for any other.

The objection to the multiplicity of operators, thereby increasing the number of personal equations affecting the result, applies more to this system than to one worked automatically; but it is questionable whether this system is not more reliable, considering the extreme nicety of adjustment and absolute precision required from all the electrical and mechanical attachments, and the liability of the whole automatic system to become deranged.

Submarine mines should be operated by a range finder entirely separate from those used for guns.

The subject is one deserving the most careful consideration, and if the superiority of any system can be *practically* demonstrated it should be adopted. Unfortunately with us, the question of cost is apt to be the leading one.

Lieut. E. M. Weaver, 2d Artillery.

I had the pleasure of listening to the interesting paper of Captain Zalinski when it was read by him before the West Point Branch. In the discussion which followed one or two points were brought forward which appear still to have a bearing.

Before proceeding, however, to present these, it may be well to note a modification the captain has introduced in the paper in revising it for publication. At the West Point meeting he was opposed to the use of "parallel fire" of a group; that is, fire in which the axes of all the guns are parallel and the group is fired as a unit. The paper now seems to give recognition to this kind of fire under the name of "dispersed fire," but not in a very positive way. It is believed that this kind of fire is as advantageous to guns when firing at an object not seen by the gunners, as General Abbot has shown it to be in the case of mortar groups. What follows will in some degree point out this advantage.

It is taken to be axiomatic that the highest order of fire from any fire-arm—the fire, all things being equal, that will give the highest per cent. of hits—is that in which the same person sees the object, aims the gun, and fires it. In proportion as these conditions are departed from the value of fire falls off. Therefore, any fire which requires that one man observe the object, and a second, or, perhaps, a third, aim and fire the gun at an object which he himself does not see, a system of signals and a train of more or less delicate and complex apparatus being introduced between the one who sees the object and the one who fires the gun, that fire must of necessity be of a low order, in so far as accuracy is concerned, and will only be employed as a last resort. Now it is a fire of this special nature that is involved in this discussion, and is termed "indirect fire" by Captain Zalinski. As to whether it is or is not likely that such fire will have to be used in future sea-coast warfare, or the extent to which it may have to be used, is a distinct question which might be agreed *pro* and *con*, but which does not happen to be up for discussion now.

It is thought that Captain Zalinski's paper does not bring out in sufficiently clear relief the two-fold nature of the subject of Range and Position Finding. The problem divides itself into:

1. The apparatus employed to connect the observer with the one at the guns (the receiver).

2. The system employed in plotting the signals transmitted by the observer to the receiver.

It is evident that the position of the observed object must first be plotted, in some

way, on a chart-sheet, before any information as to its actual position on the water in front of the guns can be had by those at the guns, who do not see the object.

Captain Zalinski's paper does not touch upon the first of the divisions given above. It refers only to the second, and is, in fact, a comparison of the "block system" of plotting with the "polar coördinate" system.

It is clear, of course, that whatever apparatus is employed for signalling between the observer and receiver, it might be possible to adapt it to either of the two systems of plotting. Neither the polar coördinate system, nor the block system, nor, indeed, any system, can avoid the subdivision of work here indicated; they must, all, equally contend with the difficulties inherently connected with the conditions associated with indirect fire; there must be an observer and a receiver and apparatus placing them in communication with each other and with the guns.

If the one who is at the plotting board (where the tracing of the vessel's path is made) does not himself aim and fire the guns, the necessity arises for introducing additional apparatus for signalling from the plotting board to the guns. This is the usual arrangement. The apparatus becomes too complicated to be practical when it is attempted to automatically plot the tracing and automatically signal to the guns. Nothing mechanical can displace human intelligence at the plotting board, or should be permitted to.

It is assumed, therefore, that the simplest practicable arrangement involves a receiver, an observer, the apparatus between the receiver and the observer, and the apparatus between the receiver and the guns.

The defect of the block system is, that a ship may stand within the limits of a block, and if the area of the block is larger than the area of the "dangerous space" of the ship, the ship may find a safety space, where the fire of the fort guns, aimed, say, at the centre of the block, will pass over, strike short, or go to one side of the ship. If the ship be in motion we have, in addition, the difficulty pointed out by Captain Zalinski on page 766; that is, the difficulty of predicting what the *precise* path of a moving ship will be; and the main burden of Captain Zalinski's paper is to show that this cannot be done by the block system. But the question arises, is the polar coördinate system free from this same criticism? Captain Zalinski evidently assumes that it is, but it is believed that a little analysis will show that it is as unsafe a guide in this matter and as defective as the block system. Every argument that Captain Zalinski makes against the block system may be turned with equal force against the polar coördinate system, but in a different way. The block system errs by allowing safety spaces within the limits of a block. The polar coördinate system errs by striving to attain a degree of exactness in forecasting the position of a moving object that is not possible under the conditions that obtain in indirect fire at moving objects.

Let the details of these conditions be examined a little:

The receiver at the plotting-sheet notes the position of the object as indicated by the tracing, at a given instant. This tracing, and therefore the position, is more or less untrue and misleading, by reason of the *personal* errors of observation of the observer and also the *instrumental* errors of the apparatus between the receiver and the observer. On the basis of this *only approximately true data* the receiver must determine for the gunners the actual position of the ship on the water in front of the guns, not for the given instant, but *for some future instant.*

The tracing on the chart-sheet is not a true reproduction of the ship's position, and, because of human and mechanical limitations, never can be. The receiver must estimate the time required to transmit his signals to the guns, the time it will take the gunners to get their guns ready, and the time of flight of the projectiles. Each one of these divisions involves other errors, and personal equations, and, after doing all

this, there remains the most difficult task of all, namely, he must select a point on the chart-sheet ahead of the end of the tracing, and thus predict just where the ship will be at the expiration of the estimated time, which, let us suppose, is 40 seconds. In this there will be introduced the aggregate of all the personal and instrumental errors going before, and, what is, perhaps, most important, errors as to the direction and rate of the moving ship. In truth, the final act is nothing but a more or less intelligent *guess* based upon necessarily untrue data. The bare statement of the problem shows that it is impossible to reproduce on a chart by this process the exact position a ship will occupy when the projectiles have made their flight.

Captain Zalinski has assumed a straight course (A B Fig. 1, p. 765) for the moving ship, but suppose the ship should follow a ziz-zag course, as the *Condor* did before the forts of Alexandria,—and this will certainly be the rule in the future,—and suppose, further, that the ship should change her course or rate, or both, just after the receiver had made the estimates above specified. It would be, say, 35 seconds before the projectiles reached the end of their flight, at the point guessed ahead by the receiver; if now all the data upon which the guess was based were absolutely true, the change of direction or rate would prevent the ship and shot meeting at the point chosen. The chances are still less when we consider the errors unavoidably ensconced within the data. If the ship were moving on a perfectly straight course, without change of speed, these errors alone would make it impossible for the receiver, or, rather the system, to forecast precisely the target.

These considerations, it is thought, show it to be impossible to predict the position of a ship, and therefore to trace her path, except within limits—limits that shall be ample enough to neutralize the errors, instrumental and personal, referred to. With this approximately true data and the personal errors, we can, probably, predict the *area* that will include the ship at the end of 35 seconds, but we certainly cannot predict the precise point. It appears therefore, that indirect fire at moving targets demands an *area* (block) system and is not adapted to a *point* (polar coördinate) system.

An area or block system being essential, the important point that comes up for determination is the size and form of the blocks.

From the above it is seen that there must be no safety spaces. This gives a clue as to the dimensions measured out from the gun—the range dimension. If we make this depend on the *dangerous space* of an average battle-ship there will be no position in any block that will permit the shot to pass over or strike short. The azimuth dimension may be taken to be the length of an average man-of-war, say, 300 feet.

Herewith is given the range dimensions of such a system of blocks up to 6000 yards, arranged for the 119-ton Krupp gun attacking a ship presenting a target of 30 feet vertical and 300 feet horizontal (length).

	Range.	Angle of Fall.	Width of Range-Zone.		Range.	Angle of Fall.	Width of Range-Zone.
1.	1000 yds.	0° 54′	637 yds.	16.	4320 yds.	4° 54′	117 yds.
2.	1637 "	1° 33′	369 "	17.	4437 "	5° 04′	113 "
3.	2006 "	1° 57′	293 "	18.	4546 "	5° 12′	110 "
4.	2300 "	2° 10′	264 "	19.	4656 "	5° 22′	106 "
5.	2564 "	2° 35′	222 "	20.	4762 "	5° 32′	103 "
6.	2786 "	2° 50′	201 "	21.	4865 "	5° 41′	100 "
7.	2987 "	3° 04′	181 "	22.	4965 "	5° 50′	98 "
8.	3174 "	3° 20′	172 "	23.	5063 "	6° 00′	85 "
9.	3346 "	3° 34′	160 "	24.	5158 "	6° 10′	92 "
10.	3506 "	3° 44′	151 "	25.	5250 "	6° 19′	90 "
11.	3657 "	3° 57′	145 "	26.	5340 "	6° 28′	88 "
12.	3802 "	4° 08′	138 "	27.	5428 "	6° 37′	86 "
13.	3940 "	4° 19′	132 "	28.	5514 "	6° 44′	85 "
14.	4072 "	4° 31′	127 "	29.	5599 "	6° 53′	82 "
15.	4199 "	4° 43′	122 "				

It is to be noted that the range dimensions are variable, depending on the angle of fall at each range.

These range-zones would be arranged in concentric circles about each group of guns, and, since, in indirect fire at moving objects the guns will be fired together with axes parallel, the fire of the group would, for any position of a ship, be *evenly distributed over the dangerous space* of the ship; to borrow a shot-gun term, we should have a good "pattern" for the particular target we are shooting at, namely, the broadside of a ship, or, projected on the water, the dangerous space.

For any given water area such a system will require about one-third fewer blocks than the 100-yard uniform block system.

Another important consideration in this problem is the determination of the maximum error in time, for ordinary conditions, that can be made in forecasting the position of a ship and still hit the ship.

Let us assume, by way of example, a ship moving in azimuth across the plane of fire at a 10-knot speed and at 6000 yards range. The prediction for such a case would have to be for, say, 35 seconds* ahead. In this time the ship will pass over about 200 yards, say, twice her length, or about 50 yards—one-half ship length—in 8½ seconds. If, now, the polar coördinate system be in use the observer will signal to the receiver the locus of the middle vertical line of the ship's hull, and the prediction will be made to the gunners for this same line. If all the guns be accurately aimed, and if the flight of each projectile be true to the range table, it is evident that if an error of nine seconds be made, from any or all causes, in estimating the change of the ship's position expressed in time, the shots will go in front of or behind the ship.

If parallel group-fire (dispersed fire) be employed, and we assume four guns to a group, the front of the group being 100 yards, the ship will have some part of her hull within the limits of the "pattern" of the group throughout 250 yards of her course; it would take the ship 42 seconds to pass over this distance, that is, an error in calculation of 42 seconds can be made with still a chance of hitting.

The first system has a limit of 9 seconds within which it must hit with all, or exceeding it, miss with all; the second has a limit of 42 seconds within which it has chances of hitting with from one to four shots.

To summarize, it is thought, that in firing indirectly at moving objects:

1. The precise path of a ship cannot be predicted by any system; that the path may be predicted within certain limits, and this requires an area (block) system in contradistinction to a system of points.

2. Parallel group-fire will be most efficacious, since it increases about five times the possible time error that may be made in the process of forecasting.

Finally, the inferior nature of indirect fire should always be kept in mind, and it must not be supposed that it can be promoted to an equality with open direct fire, by introducing complicated apparatus and multiplying the number of persons connected with laying the guns.

Lieut. S. E. Allen, 5th Artillery.

It is but a waste of time to deplore the fact that there is so little to be found in the United States on which to base the discussion of a system for directing and controlling the fire of sea-coast guns. But while awaiting the results of the processes now slowly working towards the provision of sea-coast defenses, it is wise and proper that we should study the methods of foreign nations, investigate theoretically, and, as far as possible determine practically the details of such a system.

In this direction the efforts of several officers have resulted in excellent if not yet

* For mortar firing this would be about 70 seconds.

perfect position-finders. The necessity for these is no longer questioned. The development and perfection, to fulfill all requirements, of the three prominent types of position-finders is reasonably assured. When we get them, how are they to be used to the best advantage? What appliances and methods must be used at the guns to reap the full benefit of the advantages they offer? Every officer of artillery, unless especially interested in other professional subjects, should select for himself one or a part of one of these problems, and make the study and solution of it a particular object.

Captain Zalinski, in discussing the method of position-finding by aid of the system of squares, has clearly stated the reasons for which this system must be laid aside with the obsolete smooth-bore guns. He has also distinctly defined the system of polar coördinates now generally superseding the other method, and enumerated its many advantages, leaving little to be commented upon so far as he has gone.

In addition he might well have made more prominent one point incidentally mentioned, *i. e.*, the practicability, under such a system, of so adjusting the devices for showing the elevation and direction of a gun that when the gunners elevate and direct it for the range and direction indicated by the position-finder at any instant, the gun will actually be pointed so the shot will strike the point which the moving target will have reached at the end of the period of time of flight.

To do this with modern guns requires that the elevation and direction be given independently and simultaneously, and that the elevating and traversing devices permit the gun to be fired while it is being pointed. Such devices are in use on both naval and sea-coast carriages, and no carriage should be constructed in future without them.

The system for transmitting from the position-finder to the guns the indication of the position of the target (which Captain Zalinski simply outlined by stating the requirements it should fulfill), should permit the *angular change in direction* and the *change in range* of the target to be recorded or read directly from the instrument for any given interval of time—as that of time of flight of the projectile.

The captain of a gun-group would then simply compute the total angular allowance in direction which must be made for this change of target, drift, wind deflection and constant error of the indicating instrument (if any), and cause this allowance to be made on the sight or index pointer of the traverse-circle scale. For elevations he would compute the total change in elevation for the change of target, effect of wind and error in indicated range, if any.

This method could be applied equally well to any kind of fire, including that of mortars mounted on modern carriages, notwithstanding the long time of flight. If the shots then fail to strike the target, additional allowances could be made in the same way to correct for the observed deviations. These allowances would be computed by the captain and be applied at the guns by competent non-commissioned officers.

Lieutenant Fiske of the Navy, with his position-finder, contemplates sending indications to the guns. The details of this development of his system I do not know. It is easy to see, however, that the principle on which the position-finder is based can be employed in an instrument for transmitting the polar coördinates of a moving target.

The details of the automatic system proposed by Captain Zalinski would also be interesting.

Another consideration is rendered more important by the accuracy of fire of modern guns and the perfection of position-finding. How may a captain be informed of the striking point of shots which miss the target? In the long range firing of which our new guns are to be capable, it will be impossible for an observer to estimate the distance of the point struck from the target. With all the varying conditions under which firing may be conducted it is not certain that the range attained by a projectile will be ex-

actly equal to the distance to the target announced by the position-finder, even if the latter is perfectly accurate. The error made in estimating the distance short or over will therefore increase the probability of missing exactly in proportion to accuracy of fire of the gun and accuracy of the position-finder.

In the individual firing of a number of guns at a single vessel there would be so much confusion of striking shots that shot-plotting would be impracticable. In mortar firing, or firing of one or more gun-groups by volley it would not be difficult to devise means for plotting approximately the centre of impact of the group. By adopting simple regulations and giving warning to the observers, the position-finders could be momentarily diverted from vessel tracking to shot-plotting in such cases.

In the individual firing of guns the problem is difficult but none the less important, and is deserving of serious consideration.

IV.

"Military Penology."*

Lieut.-Col. Charles R. Greenleaf, Assistant Medical Purveyor, U. S. A.

IN his article on this subject, in the JOURNAL for July, 1891, Captain Pope, referring to the necessity for identifying recruits (p. 791), makes the following statements:

"Recently the Medical Department has adopted a system which, if successful, would go far to accomplish this end. That its success seems doubtful must be admitted, and that it is not the most certain means is indisputable. By far the best means yet proposed, consists in taking the measurements of all recruits by the Bertillon method and a photographic negative."

The statement as to choice of method is answered as follows by M. Bertillon on pp. 20 and 21 of his pamphlet on the *Identification of Criminals*. Speaking of scars and marks, he says:

"There is not certainly in all this city a second person who can exhibit, similarly situated, the two marks just described. These particular characters and descriptions are within the range of every one's comprehension, and are infinitely less deceptive and less costly than photographs. I will say even that they offer a greater guarantee for identification than measurements, and that they would take their place altogether if it were possible to use them as a basis of classification."

Mr. Muller, in his *Instructions* (p. 76, par. 60) for taking measurements after the Bertillon method, says:

"There is no one who does not bear on his person, in greater or less numbers, and often unknown to himself, some moles or scars. Five or six of these individual marks will suffice to distinguish a man among millions of others, on the *sine qua non* condition, however, that they be minutely described."

The statement as to the doubtful success of the figure card system adopted by the Medical Department is answered by the records of the War Department, which show that the system of identification now in use, and described by me in the JOURNAL of the Military Service Institution for November, 1889, is completely successful. Its scope is as yet limited to enlistments that have been made since the date of its adoption (April 1, 1889), and it is applied only to deserters, ex-convicts, and others who, having left the service for cause, attempt re-enlistment. So soon as figure cards of all the enlisted men in the Army have been received, its application will be extended to all re-

* Captain Pope's paper upon Military Penology was read before the Fort Leavenworth Branch, M. S. I., prior to its publication in the JOURNAL. This announcement was inadvertently omitted when it was printed.

enlistments, and these will not be possible without immediate information at the War Department as to previous service.

The difficulties incident to the adoption of any new system in military administration, made this one practically inoperative until September, 1890. Its objects and details being then understood, the figure cards correctly prepared, and the reports of desertion and enforced discharges promptly made, the first case of identity was proved; since that time, sixty others are recorded, making a total of sixty-one cases, viz., 26 deserters, 22 ex-convicts, 12 re-enlistments of men previously discharged for cause, and one ex-convict who had been re-enlisted by authority.

The total number of correctly prepared cards that have been received is about 3000; the time necessary for examination and identification averages about two minutes for each card.

M. Bertillon commenced his system with 30,000 photographs, and identified but forty-nine *recidivistes* during the first year.

With a working system which gives such excellent practical results as does this of the figure cards, it does not seem necessary to discuss the ethical and other objections which can be made against the introduction into the Army of the Bertillon system for the identification of criminals.

V.

"Value and Limitation of Field Exercises."

Bvt. Colonel L. H. Carpenter, U. S. A., Major 5th Cavalry.

THE manœuvres under General Merritt in the summer of 1889, were happily conceived and satisfactorily executed. Similar exercises in other parts of the country have awakened a great interest in field instruction, and it is now apparent that an authorized work on this subject is very much needed in the United States Army, and also in the National Guard. The student officers at the Infantry and Cavalry School at Fort Leavenworth are now compelled to purchase certain English books written on this subject which are the best attainable but not altogether satisfactory in the light of our experience in this country. To the objection of being obliged to study the foreign methods, which do not give proper weight to the American ideas, is added the necessary expense of these books with the duty added.

Orders from the War Department require instruction to be carried on at all of the posts during certain months of the year in the minor operations of war, which must include officers and non-commissioned officers, but no provision has been made to furnish the books and material to impart this information. Many of the officers would probably purchase the necessary works through an *esprit de corps* or desire for improvement, but the enlisted men cannot be expected to do this out of their slender pay, and it will not be asked of them.

It seems therefore manifestly desirable, for the sake of uniformity and to obtain the best results, that the War Department should convene a board of officers, preferably at Fort Leavenworth, to prepare carefully a manual of field instruction, which should embody the principles and methods developed in the experience in this country, together with that which may be gathered of service from European authorities.

The use of cavalry in the minor operations should not be in accordance with foreign views, but as practised in the Civil War, where it was used both mounted and dismounted, as an offensive and defensive arm.

We have the best cavalry equipments and the best system, and in course of time the conservative military students of Germany, England and France will be compelled to give proper consideration to the lessons to be learned on this side of the Atlantic. The German cavalry in the War of 1870, rode well and gained much information for

the advancing armies, but it was all done without opposition from the French cavalry. Their deployments at great distances in the screening operations were not carried on in the face of an active, energetic and enterprising hostile mounted force, quick to seize opportunities. The merit of the German methods has not been proven yet in war, and this brings us to the conclusion that very little of importance has been developed in cavalry since the War of 1861–65 in America. This does not apply, of course, to the infantry and artillery, and the changes in tactics and the disposition of troops brought about by the improvement in small arms and field pieces. Upon these points we gain much valuable information by the study of the military works written in Europe since 1866. It is very probable, however, that the Europeans will be forced in the future to make an extensive use of the shelter trenches similar to the practice of the Union and Confederate troops in the American war.

After the manual has been prepared conveying the ideas and practice suited to this country, it should be furnished from the Adjutant-General's office to the officers and non-commissioned officers of the Army, as the drill regulations are, and also should be required to be adopted in the National Guard of the different States.

If this is done a good work will be accomplished.

Captain J. W. Pope, A. Q. M.

Through the highly-appreciated courtesy and kindness of General Merritt, I was permitted to visit his camp during the field manœuvres of 1889, in Indian Territory, and to witness at least two of the general movements described by Major Babcock in his very interesting and instructive paper. I desire, therefore, to bear testimony, obtained from personal observation in visiting all the various elements of the command, to the very great interest manifested on the part of all officers in all the details of the manœuvres. By reason of the admirable system adopted, which required every officer taking part to render a report of his actions, there was enlisted not only the earnest interest of all, but the greatest spirit of emulation was excited, causing each to do his full duty to the best of his ability. In truth the interest manifested was greater than in many a real campaign where the subordinate must often perform his arduous duties with little expectation that his efforts will excite special notice. The camp exhibited a scene of the most earnest activity and excitement, with no place for idleness or relaxation. Each night found the officials of every grade in zealous study over the requirements of the succeeding day, the result of which all felt would speedily reach the eye of the distinguished commander. It was particularly noticeable that everything was conducted upon a plan to be expected in veritable war, and nothing of the "sham battle" order was tolerated.

The two general movements I witnessed while accompanying the staff of the commanding general were carried out in perfect accord with the requirements of modern war, and undoubtedly proved full of instruction to those engaged. The marching of the various detachments, the concert of action of different arms of the service, the expectation excited by the probability of some unforeseen movement happening, the occasions for exercise of judgment on the part of the various commanders, and the general alertness of all, formed a picture which was difficult to associate with mere instruction, the only drawback appearing in the regrettable want of strength in the various commands, which makes semblance of war so difficult with our diminutive military forces.

In visiting the camps of separate commands, we found officers deeply engaged in the study of maps, writing reports, and discussing the past or succeeding operations in the most earnest manner. In fact, every proof was seen of the greatest interest excited in the minds of the whole command.

The benefit to be derived from such field manœuvres is so apparent that it can only be hoped that no opportunity will be lost to continue them, and to extend their scope in future.

It is certain that Major Babcock has not overstated the results of the field instruction of 1889, and it is to be desired that his able paper may result in accomplishing the aim for which he has so plainly pointed out and demonstrated the importance. The necessity for practical field operations has become more pressing in view of the fact that we can no longer depend upon the fruitful field of active experience yielded by the Indian wars of the past, which have probably been a more potent agent than is generally realized in moulding the martial characteristics of many of the great leaders who have adorned the military annals of our country.

Lieut. Arthur L. Wagner, 6th Infantry.

It may be confidently asserted that there is no branch of military science of greater importance than minor tactics; and it must be acknowledged regretfully that no feature of military study has been more generally neglected in our service. When we consider that the subject embraces not only the formations of the several arms for attack and defense, but everything pertaining to the security and information of a command, its paramount importance needs no argument.

Yet, notwithstanding the fact that a knowledge of minor tactics is essential in the field for every one exercising command in the Army—from the general-in-chief down to the group leaders—there is no authorized text book on the subject in our service; and there are many company officers who have never seen an outpost established, who know nothing practically of advanced-guard duties, and to whom the *tactics* of the present day is as a sealed book. This statement may seem too strong and sweeping; but I make it advisedly. I have in the course of my duties as assistant instructor at the Infantry and Cavalry School met young officers who, at the time of reporting for duty as students, had never read a book on the subject of minor tactics, and who scarcely seemed to be aware that minor tactics and the drill regulations were not identical.

The unfortunate neglect of this important study may be traced back to our military fountain head, West Point. During my entire service as a cadet, I never saw a formation of an advanced-guard, or a rear guard, or the establishment of an outpost. I never had it impressed upon my mind that the performance of guard duty was to be carried further than the mere "interior guard" which protected the cadet camp; and until I entered upon the limited course in the Art of War which formed (and I think still forms) a mere adjunct to the department of engineering, I do not know that I heard the word "outpost" spoken. Notwithstanding the fact that the topography at the Point is admirably adapted to object lessons in tactics, I never saw pointed out a good position for a battalion or a battery, or heard a word on the subject from any instructor; and the only attack formations I saw were skirmish lines formed and conducted in open violation of the requirements of modern warfare. This may have been changed since; but from what I hear, I conclude that in tactics the Academy is still marking time.

I have no desire to enter upon a criticism of the Academy or its methods. The general excellence of the education given by our *alma mater* is so marked that it is, perhaps, an ungracious task to point out spots on the sun. It may be that (for reasons not apparent to me) the study of minor tactics at the Point is impracticable. Certainly the able officers in charge of the institution give careful consideration to all matters pertaining to the instruction of the cadets, and I have no desire to thrust upon them suggestions of my own. I merely wish to point out the fact that when a cadet leaves the Military Academy his knowledge of minor tactics is practically *nil*, and that his

post-graduate opportunities for acquiring a familiarity with the subject are not good.

The subject of minor tactics cannot be learned from books alone. Exercises in the field are as necessary for an understanding of the principles taught as in the case of drill regulations. To suppose that a graduate of the Academy can "pick up" a knowledge of this important subject by perusing any number of books on minor tactics is as absurd as it would be to suppose that a man could master the infantry drill by reading Upton's tactics (so-called) without ever appearing on the drill ground. Moreover, no other practical military exercises require such care in their preparation, and so much good judgment in their execution, as the field exercises in minor tactics. Properly conducted, their value is inestimable; but if allowed, through carelessness or ignorance, to degenerate into "sham-battle" nonsense, their effect is positively pernicious, as it accustoms the participants to conditions that do not exist on the field of battle. Instruction in minor tactics is, then, not only of the greatest importance, but it is also a matter of very considerable difficulty; yet we are without the slightest approach to anything like an authorized manual on the subject.

Theoretical instruction, combined with field exercises, in minor tactics is given at the Infantry and Cavalry School, and extended exercises have been given to the troops of the Department of the Missouri in the camp at Chilocco. The value of these exercises does not admit of doubt. I have conversed on the subject with many graduates of the Infantry and Cavalry School, and among those gentlemen the opinion seems to be universal, that the field exercises are the most valuable military instruction that the Infantry and Cavalry School—or any other school—can give. Yet this instruction, from the very nature of things, has been mainly limited to the student officers at Fort Leavenworth, and at most posts the officers do not receive it at all. Even at Fort Leavenworth, this instruction meets with many obstacles. Field exercises in minor tactics have not yet been prescribed by the War Department; and often when everything else is in readiness the troops are engaged in target practice or in some of the routine drills, and the field exercises have to give way to more imperative but less important instruction. Moreover, the want of an authorized American text book on minor tactics necessitates the use of English text books, which (even in the case of Shaw's excellent work) are often subjected to the sneer that they are, after all, "a British re-hash of 'Dutch' theories."

I firmly believe that the proper training of our Army demands:

1. The official recognition of theoretical instruction and practical exercises in minor tactics as part of the military training at every post.

2. The setting aside of a certain period each year in which this instruction shall be imperatively required.

3. The adoption of an official manual of minor tactics.

The manual should be prepared by a board of thoroughly qualified officers, who should be (as Major Babcock suggests) able to set forth the results of American experience, as well as to select the best deductions from European practice. Any subaltern of fifteen minutes' service, and possessing a cerebral development equal to that of a humming bird, might easily paraphrase Shaw, put the result in a blue cover, and call it an American book. But such a work would scarcely answer the purpose; and it is to be hoped that when the book *does* appear it will be the result of the labors of those who know whereof they speak. With such a manual in use, there can be no doubt that the military instruction of our Army will at once rise to a higher plane, and the everlasting monotony of perfunctory drills may be relieved by a system of instruction which will interest the men as well as give them military knowledge of the highest value.

There are always owls to hoot at the noonday sun because its radiance hurts their own weak eyes. Such owls are to be found in uniform; and one of their hoots takes the form of decrying field exercises as mere "playing at war," and proclaiming that in such exercises the conditions of war do not exist. As Major Babcock truly points out, the conditions of war *do* exist in many phases of the field exercises; and it is only when those in charge of the exercises allow them to degenerate into sham battle fusillades, with "noise and fury signifying nothing," that the conditions of war are absent. In 1866, Prussia, after a half-century of almost unbroken peace, entered the lists against a formidable military power which had had two great wars within eighteen years. The Austrian leaders had genuine war experience; but in time of peace the training of their army consisted of mere "barrack-yard drills." The Prussians had been playing at war for fifty years, and in the wonderful Seven Weeks' War the superiority of their methods was so marked, that the "mimicry of war" is now the most important feature of the training of all European armies. Autumn manœuvres on the European scale are with us impossible; but field exercises in minor tactics are practicable at any post. The fact that there are many things in war that cannot be learned in peace, does not justify us in neglecting those requirements of war which *can* be learned in garrison. It is not the part of wisdom to postpone our tactical instruction until we are compelled to learn our lessons from the book of bitter experience written in letters of blood.

Reprints and Translations.*

SHIPS *VERSUS* FORTS.

By CAPTAIN T. S. JACKSON, R. N.

(*From "Occasional Papers." R. E. Institute, Chatham, England.*)†

PURELY naval attacks on fortresses have been few in number, and have only been successful when the ships possessed a decided superiority over the batteries, or at places where the garrisons were decidedly inferior in skill and courage to the attacking crew. Ordinary sea-going ships-of-war are not, and never have been, intended by their designers to engage forts. They are built to fight other ships. This important fact, usually forgotten, goes far to account for the difficulties under which ships labor in an engagement with coast defenses.

The old wooden line-of-battle ships were no match for the fortresses of their day, and there is no reason to suppose that modern ships-of-war, protected in a great measure as they are against projectiles, are more fitted than their predecessors for an attack on batteries on shore. No doubt ships have been successful against forts. In many cases the rapid and concentrated fire of a squadron directed against a number of crowded and ill-protected guns on shore has silenced all opposition for a time. Where a military force has been at hand, or when a sufficient landing-party has been available from the squadron, this temporary success has sometimes been rendered complete. Occasionally, the object of the attack, such as the enforcement of the demands made on a semi-civilized Power, has been attained by the mere fact of temporarily silencing the defenses. But, as a rule, attacks on shore batteries by sea-going ships not specially equipped for the purpose, have not been attended with success calculated to encourage naval commanders to engage in such operations. The risk of serious damage to, or loss of, ships, and the certainty of heavy loss to the crews, are of course, merely conditions which are common to all forms of naval warfare, and are not peculiar to attacks on fortresses. But the enormous expenditure of ammunition necessary to produce any considerable effect on well-designed shore defenses, and the possible difficulty of replenishing the ships' magazines after an engagement, are factors which must be taken into account. The vicinity of a hostile squadron, and the probability of having to fight a

*Please address communications concerning reprints, translations and reviews to Lieut. J. C. Bush, editor of this department.

†By permission.

naval action before the damage incurred in an action against coast-defenses have been repaired, and before ammunition has been completed, will generally suffice to prevent an attack.

Every modern improvement in guns and their ammunition tends to increase the superiority of shore defenses over ships. The increased accuracy of fire of modern guns can be taken advantage of, to its full extent, only when the guns are mounted on shore. The inaccuracy of fire from ships is due to the unsteadiness of the platform, not to faults of the weapon or want of skill in its use. This cause of error is a constant factor, and is not affected by improvements in the guns. The shore gun has only to be pointed correctly. The gun afloat must not only be correctly laid, but must be fired at the instant the sights are brought on by the motion. Modern mountings have greatly improved naval shooting, but cannot compensate for the inherent defect of a floating platform. No satisfactory means of range-finding exists afloat; while on shore the position of a ship is determined by looking at her through a telescope. Although better arrangements for range-finding may hereafter be made on board ships, it is improbable that they will ever equal those used on shore.

There are fortresses, and fortresses. Given fifty years ago, prior to the introduction of shell-fire from guns, a masonry battery such as Southsea Castle, or an earthwork on a low site crowded with guns and insufficiently traversed, place alongside it a number of wooden ships of the old type, mounting at least ten times the number of guns in the work, a naval success was then possible, or even probable. The introduction of direct shell-fire greatly enhanced the risk incurred by wooden ships in attacking batteries without proportionately increasing their powers of offense.

* * * In order to estimate the chances of success of a naval attack on modern works of fortification, it is necessary to look at the case from another point of view. Instead of an iron-plated fort, barely calculated to keep out the projectiles in use twenty years ago, suppose that the defense consists of heavy guns, dispersed in earthworks, placed on high sites wherever possible without receding too far from the limit of navigable water, and nearly invisible from the sea. Now the ships have no defined object to aim at. Instead of every shot telling on iron shield or masonry, no shot counts as a hit which does not strike a gun or its mounting. Every projectile which strikes the parapet is, practically, thrown away. The target offered to an enemy by the largest gun is extremely small. The diameter of the breech of the 16.25-inch B.L. gun is 66 inches. Making a liberal allowance for the exposed portions of the mounting, the area of the target does not exceed 35 square feet when the gun is end on. If the guns are *en barbette*, and on a low site, they may possibly be silenced for a time, but the instant the fire of the attack slackens the fire of the defense will re-open; while against disappearing guns the ships are absolutely powerless.

Direct fire alone is, however, not the only resource of the defense. High-angle fire, which may now be said to be in its infancy, and which will be greatly developed in the near future, should alone be sufficient to keep ships from anchoring; and without anchoring, experience has shown that the greater part of their fire is thrown away. Submarine mines, the moral

effect of which cannot be entirely disregarded if their efficiency is denied, will add to the difficulties of the attack.

Although a naval attack on a fortress, carried out by means of ships constructed for fighting other ships, is likely to result in the discomfiture of the attacking force, vessels may be constructed much better fitted than ordinary battle-ships for a fight against forts. At present no such vessels are afloat. It is highly improbable that they will be constructed, except by a nation whose power at sea is uncontested. Further consideration of possibilities in this direction may, therefore, be disregarded as far as the defense of the British Empire is concerned. We may build such ships ourselves, but no other nation is likely to do so.

Mortar boats were built in large numbers during the war with Russia, and the same class of vessel was afterwards used with good effect in the operations on the Mississippi. Specially designed floating batteries took part in the attack on Kinburn. The first monitor was built to fight the *Merrimac*, but the seven vessels of the same type which succeeded her were intended to operate against the defenses of Charleston. Defensively, they were well fitted to engage batteries.

On the whole it may be said that at the present day a purely naval attack on a properly designed fortress, garrisoned by the troops of a civilized Power, might be *magnifique*, but under no conceivable circumstances could it be termed *la guerre*. Instances of naval success may be quoted in opposition to this view, but, as a rule, they occurred prior to the days of direct shell-fire and accurate shooting. Lord Clarendon said of Blake:* "He was the first man who brought ships to contemn castles on shore, which had been thought very formidable, and were discovered by him to make a noise only; and, though he hath been very well imitated and followed, he was the first that gave the example of that kind of naval courage and bold, resolute achievement."

In combined naval and military operations against fortresses, the coöperation of a fleet has often proved most valuable to the attack. The results of a temporary success in action are in this case secured. The ships are risked for a definite purpose, and if they are lost it is in an operation of practical warfare, not from a quixotic desire to show that the navy can do something, a sentiment which has caused more than one useless action between ships and forts.

Another legitimate use of ships is to force a passage defended by batteries. Where the squadron has consisted entirely of ships-of-war, this operation has been invariably successful. Some ships have been damaged, and have failed to get past, but the bulk have succeeded. Where the squadron has consisted partly of transports the loss has been greater; but even in this case the passage has been forced. I know of no instance of ships having been prevented from passing batteries by artillery fire alone unaided by natural or artificial obstructions.

Attacks by ships on partially defended harbors, such as our coaling stations abroad, have frequently been successful. The garrisons of such places are generally small, and the landing-party of a squadron has some chance

* Yonge's Naval History.

of gaining at least temporary possession of a work after its guns have been silenced. Very few minutes suffice to disable guns if the necessary gun-cotton charges are ready; and in the old days spiking was even more quickly performed. Many of the most successful of these attacks have been surprises. Small Colonial garrisons are likely to slacken in vigilance during a long war. Months of waiting for an enemy who never appears, and is hardly ever heard of, renders it difficult to keep up the requisite belief in his proximity. In our wars with France and Holland surprises were common, and it seems not improbable that, under similar circumstances, our mining coaling stations might be liable to be caught napping. Telegraphic communication would probably be cut and the visit of mail steamers uncertain. The garrisons would be dependent for news of the outer world on the colliers, and our own cruisers who might occasionally arrive, coal, and be off again.

A sort of confession of faith on the subject of ships *versus* forts having now been made, the next step is to call evidence in support of the views advanced.

During the eighteenth century there were many naval attacks on fortified harbors, but it is difficult to obtain any detailed account of the operations.

* * * Very few instances of naval attack on forts occurred during our long war with France and Spain. Engagements with batteries were generally incidental to other operations, such as cutting-out expeditions, and were not begun by the ships with the primary object of destroying the works.

* * * The attack on the sea forts of Sebastopol, by the allied squadrons, on October 17, 1854 (see *Plate* I), was unsuccessful, and in no way tended to advance the siege. The ships did not begin the action until hours after the French siege batteries had ceased firing. The range at which all but the English in-shore squadron engaged was far too great for the guns of the period. Whether Kinglake is correct in ascribing all the blunders committed that day to the French alliance may be doubted, but divided counsels prevailed, and plans were altered up to the last moment. The fire of the ships produced no considerable effect on the sea defenses of the place, and the naval attack does not appear in any way to have assisted the land operations.

The proceedings of the French and Turkish, and of the main body of the English ships, are of little interest. They engaged a number of masonry forts at ranges varying from 1600 to 3000 yards. Forts Alexander and Constantine were casemated works, with an upper barbette battery. The Quarantine Forts mounted 58 guns, *en barbette*, but had no casemates. The fire of the French and Turkish ships was principally directed on this last work. The depth of water was sufficient to allow ships to anchor within 500 yards. A barbette battery on a low site, with deep water close alongside, would appear to offer ideal conditions for naval attack, but long bowls were preferred to close action.

Three guns dismounted and 35 casualties among the garrison was all the effect produced on the fort by some hours' bombardment at long range.

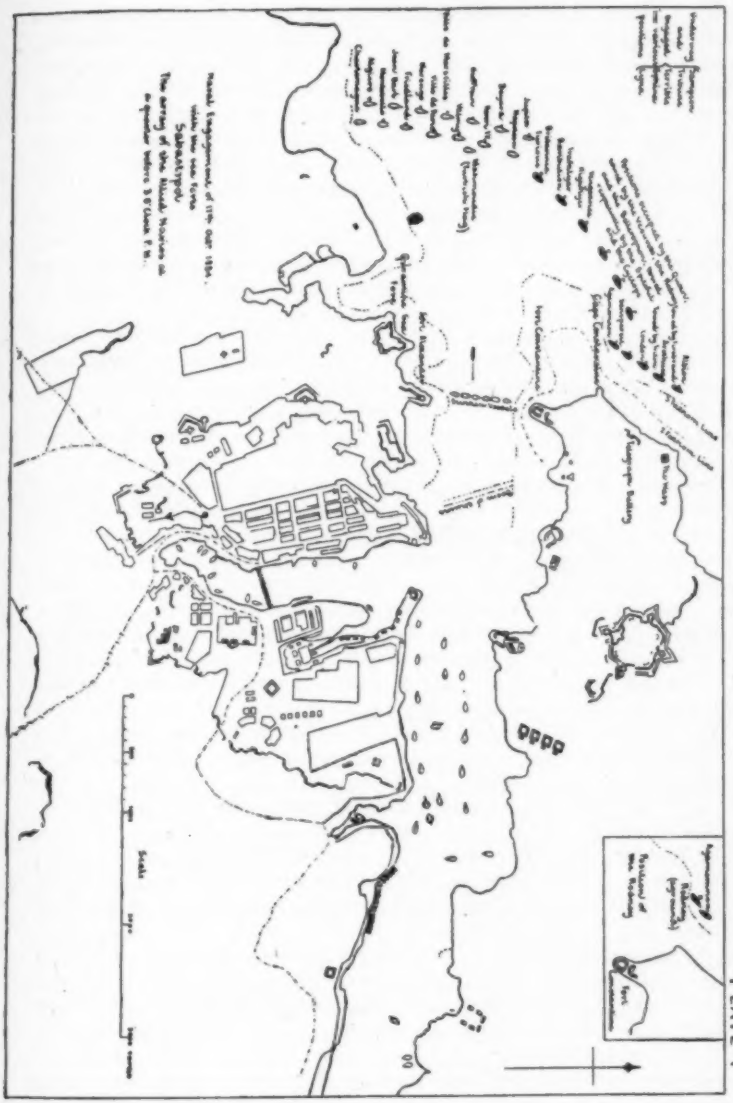


PLATE I

The British in-shore squadron originally consisted of the *Agamemnon* and *Sans-Pareil*, screw two-deckers; the *Albion* and *London*, sailing two-deckers; and the *Arethusa*, sailing frigate; these three last being towed by steamers lashed alongside. The *Agamemnon* took up a position 800 yards from Fort Constantine. The *Sans-Pareil* anchored astern of her, about 900 yards from the fort. The *London* anchored astern of the *Sans-Pareil*, 1500 yards from Constantine, but only 700 yards from the Telegraph Battery. The *Arethusa* and *Albion* prolonged the line. The upper battery of Fort Constantine was speedily silenced, the gunners were driven from the guns and took refuge in the casemates. The fire from the lower tier of the guns continued, but slackly. At a later period of the engagement the *Rodney*, towed in to support the *Agamemnon*, tailed on shore under the fort, which she engaged for two hours. She hauled off after dark without serious loss.

So far then the ships of the in-shore squadron had done very well. But the effect produced by their fire on Fort Constantine was soon counterbalanced by the damage done by the Wasp and Telegraph batteries to the vessels under their guns. These two little works on the cliff drove ship after ship out of action, and sustained little or no injury from the heavy fire to which they were exposed. The Wasp was a square tower, 27 feet high, 50 feet side, on a cliff 130 feet above the sea level, mounting eight guns, one in each corner and one in each face; five guns bore on the ships. The Telegraph Battery was an earthwork on the same cliff, 100 feet above the sea level, mounting five guns, all pointing seaward. The *Albion*, *Arethusa*, *London* and *Sans-Pareil* were successively obliged to retire. The *Bellerophon* and *Queen* coming in to support, were both set on fire and driven off. The Telegraph Battery seems to have done the greater part of the damage, and sustained absolutely no loss either in men or material.

Todleben remarks: "La cause principale du tir si efficace de ces batteries était sans contredit leur position élevée. Ajoutons que par leurs dimensions restreintes elles offraient moins de prise aux coups de l'ennemi."

There are many lessons to be learnt from this action. Among the most important are the following:

1. One head in command of a force is better than two, and infinitely better than four.

2. Two little open batteries on a high site drove six ships out of action; while an open barbette battery on a low site was silenced, and the fire of a casemated battery much reduced by three ships, assisted by others, at long range.

3. Ships engaging at or about the extreme range of their guns sustain considerable loss without inflicting any serious injury on land defenses.

The sunken hulls of the Russian ships formed an effective barrier at the entrance of the harbor, and prevented any attempt on the part of the allies to run past the defenses.

Submarine mines were then in their infancy, and, indeed, were hardly admitted to be legitimate children. The value of passive obstructions was, however, well known, and such defenses were frequently used.

The attack on Kinburn deserves notice because the assailants were pro-

vided with vessels specially constructed to engage forts, and these ships were iron-plated. This then was the first trial of iron-clads in action. The principal fort at Kinburn was a casemated work, mounting 70 guns, and was singularly well fitted to serve as a target for a powerful squadron, and especially for the iron-clad floating batteries. The fort held out for about two hours. The iron-plated batteries proved a complete success. Their armor, which now-a-days would be pierced by projectiles of comparatively small calibre, was quite proof against the shots from the fort, while the spherical shell broke into fragments on striking. This was the first skirmish of the battle of armor against guns, and it appeared that a type of vessel fit for action against forts had been built. The floating batteries engaged at Kinburn were French, but we soon followed suit in the construction of these ships, and by the time peace was concluded had several afloat.

The first two naval Powers of Europe were at war with Russia. Their ascendency at sea was complete and unassailable. One squadron of the Russian fleet was blockaded in the Baltic ports, the other was sunk as an obstruction at the entrance of Sebastopol harbor. Wooden ships had failed against the forts of Sebastopol, and in the Baltic had not been risked in attacks on Cronstadt or Sveaborg. The allies could, evidently, afford to indulge in the luxury of special ships for special purposes. Such a policy, however, is clearly only possible to a combatant whose naval supremacy is absolutely unquestioned.

In 1858 a squadron of French and English gunboats attacked the forts at the mouth of Peiho. The Chinese made no serious attempt to obstruct the passage, merely placing as an obstacle a series of bamboo cables, which snapped across the stem of the leading vessel. While the heavier gun-vessels engaged the batteries, the lighter gunboats, carrying the landing-parties of the large ships, which were unable to cross the bar, ran past. The men were landed in rear and took possession of the works, which had little or no gorge defense. Our loss was small, and was almost entirely confined to the vessels engaging the batteries at anchor. Next year's affair proved that the Chinese had profited by the lesson taught them on this occasion. They placed piles across the river, and greatly improved their batteries. Our gunboats were detained under the fire of the forts, and suffered very severely, as the range did not admit of much missing, even by Chinese gunners. Two vessels were run on shore to prevent them from sinking. However, after four hours fighting the guns of the forts were nearly silenced, and about seven o'clock in the evening a landing was decided on. When these batteries had been captured the year before, our men had been landed on the river banks in rear of the defense, but now the obstructions rendered this course impossible. Below the forts, mud banks extend some distance seaward. On the right bank our men disembarked and struggled to storm the southern batteries. They were met with a heavy musketry fire. Their loss was great, and few reached the edge of the ditches in front of the batteries. The outer ditch was crossed, as the tide had receded and it was nearly dry; but the inner ditch was full, and checked the advance. Nothing further could be done, and the survivors of the storming-party were withdrawn and re-embarked. Our total was 80 killed and 350 wounded, more

than a third of the number actually engaged. One gun vessel and two gunboats were lost. On the whole, this was as hard fighting and as thorough a thrashing as we have had for many years.

During the Civil War the United States Navy were engaged in operations of every description against land defenses. Purely naval attacks, combined naval and military attacks on fortresses, bombardments, ships forcing a passage through channels defended by batteries, gunboats acting in support of armies in the field; every variety of operation may be studied in the history of the war.

When the *Monitor* had proved a success, and her improved sisters, carrying heavier guns, had been constructed, an early opportunity was taken of testing the offensive and defensive powers of the new vessels against batteries on shore. For this purpose the *Montauk* was sent to engage Fort McAllister, an earthwork on Genesee Point, in the Ogeechee River, mounting nine guns, the heaviest of which was a 100-pounder rifle. The *Montauk*, supported by three gunboats, attacked the fort on two occasions. She was struck 13 times during the first, and 46 times during the second action, without sustaining any serious damage. One gun was disabled in the fort, but whether this result was due to direct fire, or a shell from a mortar, is not stated. As only two of the guns in the fort were of a calibre calculated to do the slightest damage to an iron-clad, and it is doubtful whether even one of these could penetrate the turret, it is not suprising that the armor of the *Montauk* proved more than a match for the projectiles fired against it. The lesson had yet to be learnt that this class of vessels was offensively unfitted to attack forts. The number of hits scored in these two affairs is most creditable to the Confederate gunners, considering the small target offered by the *Monitor*. "A cheese box on a plank," was the apt description of these vessels given by American seamen. About a month after this affair, three monitors attacked Fort McAllister at a range of 1200 yards. The action lasted for eight hours, after which the ships drew off, having sustained no injury; while, according to the report of the naval commander, no damage was done to the fort which could not be repaired in a few hours. Admiral Dupont, who commanded the South Atlantic squadron, seems now to have had a clear idea of the value of slow-firing turret ships for use against forts, more especially against earthworks, but the Navy Department at Washington thought differently. As is usual, the views of the gentlemen with their legs under office tables prevailed, and on the 7th April, 1863, the Admiral attacked Fort Sumter, Charleston, with the whole of his iron-clad force. The squadron consisted of seven monitors, one broadside ship, the *New Ironsides*, mounting 11-inch S.B. guns, and the *Keokuk*. The last-named craft could only by courtesy be called an iron-clad. The maximum thickness of her armor was two inches, with a ¾-inch skin. She carried two 11-inch S.B. guns in oval casemates. The armament of the monitors was in most cases one 15-inch S.B., and one 11-inch S.B., but in one or two vessels a 150-pounder rifle gun was substituted for the 11-inch S.B. At noon the squadron moved up the main ship channel until brought up by the obstructions laid down by the Confederates between Sullivan Island and Fort Sumter, the formidable nature of which seems to have

been unknown till they were approached. The attack was made on the flood tide, and the ships were consequently, obliged to turn. Anchoring does not appear to have been part of the programme, though this manœuvre would apparently have prevented confusion. As it was, the *New Ironsides*, flagship, anchored twice to avoid collision. The *Keokuk*, which was the rear ship of the column, was thus forced into the hottest berth of all, and after half an hour's hammering, hauled off in a sinking condition, having been struck by 90 projectiles. The distance at which the ships engaged is differently stated in the Federal and Confederate accounts of the action, but was apparently between 600 and 2000 yards. Fort Sumter, being a brick and masonry fort, afforded a most satisfactory target to the ships, and was considerably damaged, especially by the 15-inch S.B. shell. One gun was disabled out of 44. Though the heaviest guns in the Confederate batteries at Charleston were 10-inch and 9-inch S.B. and 8-inch rifles, the damage done to the attacking ships was heavy. Four of the monitors had one gun disabled out of two on board; the turret of the *Nahant* was temporarily disabled, and was "not in good order for a month." The *Keokuk*, as above stated, was totally disabled, and sank next day. No turrets were actually penetrated, but flying bolts and nuts made them extremly unpleasant quarters. The action lasted from 3 P. M. until evening, when the ships withdrew by signal.

In this attack the ships had an object to fire at which could be clearly distinguished. Every shot or shell which struck Fort Sumter produced a visible effect, and this is always cheering to seamen gunners. The practice on both sides appears to have been excellent. The result was the complete failure of the attack.

The monitors had proved the invulnerability of their vital parts. They had also shown that the disablement of their armament by the impact of projectiles or by accident to the fittings was merely a question of time. The value of obstructions was again shown. The leading monitor, the *Weehawken*, had been specially fitted with a torpedo raft on her bows, the principal effect of which appears to have been to render her steering wild, and thus to throw out the whole line. One torpedo exploded near her. Her captain reports, concerning the obstructions: "The appearance was so formidable that, upon deliberate judgment, I thought it right not to entangle the vessel in obstructions which I did not think we could have passed, and in which we should have been caught."

This was not the first occasion on which Charleston had successfully resisted a naval attack. In 1776, a British squadron of two 50-gun ships and four frigates, under Sir Peter Parker, attacked the place. Most of the ships grounded, and one frigate was abandoned and burnt. The rest of the squadron retired, having made no impression on the forts, and having suffered heavy loss.

Purely naval attack on Charleston having failed, combined operations were then commenced by the Federals. General Gillmore established himself on Morris Island, and constructed batteries to attack Fort Wagner. The coöperation of the Navy now proved of the greatest value. The ironclad ships engaged Fort Wagner whenever it was necessary to assist in the

operations of the Army. The ships could always keep down the fire of the fort as long as they were actually firing at it, but never did any permanent injury to the work. Wagner was built entirely of timber and sandbags. Injury to such a work can be repaired without much difficulty when it is situated on a sandy island, and it is not surprising that the fire of the squadron did no considerable damage. But the ship swept the dunes of Morris Island and kept General Gillmore's front clear. Though the Confederates could throw any number of men into Fort Wagner, they never attempted a sortie, and the Federal works were pushed steadily on.

One of the earliest operations of the Civil War was the capture of the forts at Hatteras Inlet by a squadron of wooden vessels, under Commodore Stringham. The gun power of the squadron was enormously superior to that of the forts, which were entirely overmastered, and eventually surrendered, and were taken possession of by the troops which accompanied the expedition. The principal interest attached to this affair is the method of attack. During the first day's bombardment the ships kept under way and followed each other in an elliptical course. On the second day the ships anchored and kept up a steady fire from their heavy pivot guns. Concerning the attack by ships under way, Admiral Porter remarks: "The plan has the advantage of bothering the enemy's gunners, as the ships are constantly changing their range; but it detracts from the accuracy of the fire on board the vessels, and it tends to lengthen out an engagement. At Hatteras, what should have been finished in six hours took twenty-four to accomplish." In these days, when the shore gunner has efficient range-finders while the sea gunner has none, which is the more likely to be bothered by change of range?

The method of attack by vessels circling in line ahead was pursued by Admiral Dupont against Forts Walker and Beauregard, two earthworks defending the entrance to Port Royal. Fort Walker mounted 23 guns, 15 of which fired to seaward; Fort Beauregard, 20 guns, 15 of which fired to seaward. With the exception of one 6-inch in Beauregard, all were smooth-bores, varying in calibre from 32-pounders to 10-inch. Admiral Dupont's squadron consisted of 11 regular men-of-war and six armed merchant vessels, carrying in all 151 guns. Twelve thousand troops accompanied the expedition. Fort Walker, as the stronger work, was the principal object of attack. The fire of the ships was altogether too much for the Confederates, who evacuated Fort Walker, on which Fort Beauregard hauled down its flag.

In these two engagements, at Hatteras Inlet and Port Royal, wooden vessels obtained complete success against earthworks. Believers in the capacity of ships and seamen to perform miracles when called upon, may reasonably quote the victory of the United States Navy on these occasions as evidence in favor of at least a portion of their faith. But it must be remembered that in the early part of the Civil War the crews of the ships were vastly superior in discipline and skill to the garrisons of the works they attacked. The Navy, fortunately for the Union, with few exceptions, supported the Federal Government; and although the immense increase in the number of vessels in commission necessitated the enlistment of people

of all sorts, yet the nuclei of the crews consisted of disciplined and trained men-of-war's men. The earthworks in question were not up to date, and were very insufficiently traversed. "Looking from the direction of the enfilading fire from the north at Fort Walker, the wonder was that the ammunition of the guns had not been exploded, and that many more of the men who served the guns were not killed. It seemed almost a miracle that explosions did not occur in the passage-way from which the powder and shells were supplied." * The Confederate engineers profited by the experience of these defeats. Earthworks were built with heavy traverses and bomb-proofs, to which the gunners retired when the fire of the ships was too galling, only to return to their guns when there was a lull.

The armament of ordinary men-of-war has always consisted entirely of direct-firing guns. High-angle fire from ships against ships has hitherto been considered useless, and this opinion will probably be adhered to, at all events until a range-finder is invented for use afloat. High-angle fire is, however, of such admitted value against shore defenses that in organized attacks on forts it has been usual to supplement the regular men-of-war by mortar boats. Mortars were used to a great extent in the bombardment of Sveaborg; and, at the conclusion of peace with Russia, in 1856, this country possessed a very respectable fleet of mortar boats, which would have proved invaluable in case further operations in the Baltic had been required. These vessels require smooth water; but in smooth water their fire has always been effective.

The bombardment of Forts Jackson and St. Philip is a striking instance of the value of mortar boats as an adjunct to a squadron. These forts were situated at the Plaquemine bend of the Mississippi, 90 miles below New Orleans. The river at this point makes a bend running northeast for a mile and three-quarters, and then resuming a southeast course. Fort St. Philip, on the left bank of the stream, consisted of a brick and earth structure, with two water batteries on either side, mounting in all 40 smooth-bore guns, 21 of which were 24-pounders, and one 7-inch rifle. Fort Jackson, on the opposite bank, and rather below St. Philip, was a pentagonal brick casemated work, mounting altogether 62 guns, one of which was a 7-inch rifle, the remainder being smooth-bores. Of these latter 25 were 24-pounders, and 10 were flanking howitzers. The river was blocked a short distance below the forts by hulks chained together, and rafts of logs. A Confederate squadron of armed merchant steamers and tugs was stationed above the obstructions. The Federal squadron consisted of eight corvettes and sloops, and nine gunboats. The mortar flotilla comprised 20 schooners, each carrying a 13-inch mortar, with one gunboat and five other steamers in attendance. The mortar boats were organized in three divisions, two of which were anchored close under the right bank of the river, the leading vessel being 2850 yards from Fort Jackson and 3700 yards from St Philip. The remaining division was placed close to the left bank, the leading boat being 3700 yards from Fort Jackson. The hulls of the first two divisions were screened by the trees from Fort Jackson, and, to render their masts indistinguishable, each carried a bunch of brushwood at the masthead.

* "Navy in the Civil War." Vol. II.

The bombardment of Fort Jackson began on April 18, 1862, each mortar boat firing a shell every 10 minutes. After the first day's firing the second division was moved from its exposed position, and joined the other boats under the shelter of the right bank of the river. All the mortars opened fire again next morning, and continued till noon, after which one division fired while two rested. On this day one mortar boat was sunk by a shot. The bombardment was kept up in this manner until the morning of the 24th April, when the squadron passed the forts. Colonel Higgins, commander of Fort Jackson, ten years afterwards gave a graphic description of the effect of this continuous bombardment.* He states that nearly every shell fired lodged within the works. "On the first night of the attack the citadel and all buildings in rear of the fort were fired by bursting shell, and also the sandbag walls that had been thrown around the magazine doors." The fire could not be subdued, and Fort Jackson was helpless. "I was obliged to confine my men to the casemates, or we should have lost the best part of the garrison." "On the morning of the 24th, when the fleet passed, the terrible precision with which your formidable vessels hailed down their tons of bursting shell upon the devoted fort made it impossible for us to obtain either rapidity or accuracy of fire, and thus rendered the passage comparatively easy."

A passage having been cleared in the line of obstruction, the squadron weighed at 2 P. M. on the 24th, and proceeded up the river in single line ahead. The machinery of the ships was partially protected by means of cables, and the hulls were daubed with river mud to render them, as far as possible invisible. As each heavy ship opened fire on St. Philip, the garrison were driven from their guns, only to return to them directly the ship moved on. The leading ships passed the obstructions without accident, but there was some confusion among those in rear, owing to smoke. Above the forts the Confederate flotilla took part in the action. Unfortunately for the defense, their vessels were under two different heads. The ships of the Confederate navy did good work; the river defense craft did nothing. Admiral Farragut lost one corvette, the *Varuna*, rammed by a Confederate steamer. The fire of Fort Jackson was greatly kept under during the passage, not only by the continuous streams of mortar shell to which it was exposed, but also by the flanking fire of the steamers attached to the mortar flotilla, which enfiladed the water batteries. The *Itasca*, *Winona*, *Kennebec*, gunboats failed to pass the forts. After the passage of the fleet, the bombardment of Fort Jackson was resumed, and on the 29th the forts capitulated.

The reduction of the forts was then entirely due to the vertical fire of the mortar flotilla. There can be little doubt that the corvettes and gunboats would have been able to force a passage without the aid of the mortar boats; but had they done so the Mississippi would not have been open to the sea, and an action must have been fought whenever it was necessary to forward supplies to the ships above the forts. Moreover, the Federal loss in the advance on New Orleans would necessarily have been greatly increased, had not the garrison of Fort Jackson been shaken before the en-

* Porter; p. 179.

gagement with the ships began. As it was, the difficulties of the Federal squadron arose more from the strength of the current, and the attack of the Confederate steamers, than from the fire of the forts.

That ships-of-war can run past batteries, as long as the channel is unobstructed, and they are not detained under fire, has been proved over and over again, even in the days of sailing ships. During the naval operations on the Mississippi many instances occurred. The batteries at Vicksburg were passed on several occasions, in spite of the difficulties of navigation. If batteries alone could ever stop ships it might be supposed that they could do so at Vicksburg. The Mississippi here doubles in a manner which can be best understood from the plan. Vessels passing up the river, after running past the town, have to make a sharp turn against the current, which strikes them on the bow, and are thus liable to be raked at a moment when the commanders have quite enough to do to attend to the navigation of their ships. The bluffs at this point are 260 feet high, they continue close to the water till below the town, with slightly diminishing height. They then recede from the river, their height gradually diminishing to 150 feet. At the time of Farragut's first attack, one 9-inch and three 8-inch S.B., and one 18-pdr. rifle gun were placed at the highest point of the bluffs above the town, where they raked the ships before and after they passed their front. Just above these, two 24-pdr. rifles, and two 24-pdr. S.B. guns were placed. Half a mile below the town was a battery 50 feet above the river mounting two 32-pdr. rifles, and four 42-pdr. S.B. guns. Along the crest of the hill, below the town, were placed two 10-inch S,B., one 8-inch S.B., one 42-inch S.B., and five 32-pdr. and two 12-pdr. rifle guns. These were scattered over a mile or more, "so that it was hard for ships to make out their exact position. The distance from end to end of the siege (*sic*) batteries was about three miles, and as the current was running at the rate of three knots, while the speed of the fleet was not over eight, three-quarters of an hour at least was needed for each ship to pass by the front of the works. The upper batteries followed them for at least 20 minutes longer. Besides the siege (*sic*) guns, field batteries in the town, and moving from place to place, took part in the action; and a heavy fire was kept up on the vessels from the rifle pits near the turn."* Admiral Farragut's squadron consisted of five screw corvettes and six gunboats, with 16 mortar boats and their attendant steamers. The enemy's position was shelled during the 26th and 27th June, without producing any great result. The mortar boats had not now a closed fort of limited extent to deal with, as at Fort Jackson, but an extended position, the guns of which were mostly well dispersed. According to Admiral Porter, Farragut deemed the mortar flotilla "indispensable to shell out the heights." "But," says Porter, "the soldiers in the hill forts refused to stay shelled out, and when the mortars stopped playing on them they would come back from the fields and again open fire. * * * There was an area of 28 square miles, within which the Federals might throw all the shot and shell they liked. The Confederates did not mind it much, even when the shot fell in the city."

Farragut ran past Vicksburg early in the morning of the 28th June.

* "Navy in the Civil War." Vol. III.

His loss was 15 killed and 30 wounded: but eight of the former were scalded to death on board one of the steamers of the mortar flotilla, the boiler of which was pierced by a shot. The total casualties of the enemy's fire on board the ships which ran past were, therefore, only 37. Farragut then reported that the forts had been passed, and could be passed again as often as necessary, but that it would not be easy to do more than silence the batteries for a time. Vicksburg was impregnable by naval attack.

Farragut's squadron re-passed Vicksburg in July. The passage down was effected with trifling loss, though the action was fought in daylight. The fact of the current being with, instead of against, the ships, no doubt had much to do with this.

In March, 1863, Farragut passed the batteries of Port Hudson with his flagship, the *Hartford*, the other vessels of the squadron failing in the attempt to force a passage. The Confederate batteries mounted 11 S.B. guns, varying from 10-inch to 24-pdr., and eight rifled guns, from 80 to 50-pdrs. The bluffs on which they were placed are from 80 to 100 feet high, and line the left bank of the river for a mile and a half below a sharp bend. The squadron consisted of four corvettes and three gunboats, which on this occasion were lashed on the off quarter of the larger vessels. The ships weighed at 10 P. M., and proceeded up the river. As the deep water was on the starboard hand under the bluffs, the ships passed close under the batteries. Reflecting lamps had been placed, and large fires lit on the shore, to show up the ships to the aim of the gunners. The smoke from these fires and from the guns proved more formidable obstacles than the fire of the enemy. The *Hartford* could, to a certain extent, see where she was going, as she shot ahead of the smoke from her own guns: but the view of the ships astern of her was much impeded. At the bend of the river the *Hartford's* bow was swept round by the current, and she touched the ground. With the assistance of the gunboat, which was lashed on her port side, she got off and rounded the bend. The next ship, the *Richmond*, was struck by a shot, which displaced the weight of a safety valve and allowed the steam to escape to such an extent that she could not stem the current, and was compelled to retire down the river The *Monongahela* came next; her gunboat, the *Kineo*, was struck by a shot, which jammed the rudder and rendered it useless. The *Monongahela* herself ran on shore on a spit opposite the town, and was got off by the *Kineo*, which then, being unable to steer, drifted down the river. The *Monongahela* went ahead again, but when near the bend her engine broke down from a heated crank pin, and she drifted past the batteries and anchored below. The last ship, the *Mississippi*, a heavy old paddle corvette, also grounded on the spit. She had no gunboat to assist her, and was eventually, after suffering greatly from the fire of the batteries, set on fire and abandoned. Thus but one corvette and one gunboat succeeded in passing the batteries, while the squadron lost a corvette in the attempt. The casualties on board all the ships amounted to 114, including 64 missing from the *Mississippi*, 25 of whom were believed to have been killed.

In February, 1863, the *Queen of the West*, a stern-wheel river steamer, protected by cotton bales, ran past Vicksburg at daylight, and on her pas-

sage rammed a Confederate steamer which was made fast at the levee. In so doing the cotton was set on fire by the explosion of a shell. She then steamed down the river, throwing the cotton barricade overboard, and succeeded in escaping. The *Indianola*, an iron-clad steamer, was sent down a few nights after the passage of the *Queen of the West*. She passed the batteries without injury.

On the night of April 16, 1863, the squadron of the Upper Mississippi passed the Vicksburg batteries. These vessels were not sea-going men-of-war. They were either river steamers with extemporized defenses, or light draught vessels especially built for river service. As coal was scarce below Vicksburg, most of the vesssls had a coal barge lashed to their starboard side. When the leading ships came abreast of the batteries the Confederates illuminated the shore with tar barrels, and opened a heavy fire. Every possible means had been taken to protect the vessels. The weak points on the sides were covered with heavy logs. This may, perhaps, account for the low speed maintained, which was little more than the drift of the current. It was certainly sufficient to give steerage way, for some of the vessels were turned completely around by the eddy as they drifted down. One transport, laden with stores, was set on fire and sunk, and another had to be towed on shore when out of range to save her from a like fate. The armed vessels suffered very little, and their crews lost only 13 wounded. Six transports ran the gauntlet a few nights afterwards. One sank after getting by, and the others were more or less damaged.

Thus instances occurred over and over again of squadrons and of single ships running past batteries. In no case could guns on shore block the passage. The guns used in these engagements, in spite of the inferiority of the Confederates as to ordnance, were far more capable of doing serious damage to the ships to which they were opposed than are the guns of the present day capable of inflicting vital injury on modern iron-clads. Knocking the upper works to pieces and killing or wounding a portion of the crew will not stop a ship. Only three fighting ships, in all the engagements which have been quoted, were prevented by the enemy's fire from passing batteries.

In the advance on New Orleans, the *Varuna* was rammed by an enemy; the *Kennebec* and *Winona* fouled obstructions and were separated from the rest of the squadron. The *Itasca* alone was disabled by the fire of the forts, a shot from which struck her boiler. In Farragut's first run past Vicksburg, the *Brooklyn*, *Kennebec* and *Katahdin* remained below, owing to misconception concerning the Admiral's intention. As these three vessels were under the fire of the batteries for about double the time during which they would have been exposed had they followed the rest of the squadron, it is reasonable to suppose that they could have passed with the others. No ship on this occasion was disabled by gun-fire. Farragut's return run down the river was accomplished without injury to the ships. Porter's squadron passed Vicksburg with the loss of one transport—not a fighting ship. More damage was done by the batteries in the passage of Port Hudson by Farragut than in any other engagement of this description. The movement succeeded, for its object was gained by the presence of the *Hartford* and

Albatross at the mouth of the Red River. The *Kineo* and *Richmond* were undoubtedly stopped by gun-fire, and the latter carried the *Genesee* out of action with her. The *Monongahela's* failure was due to an accident to her machinery. The *Mississippi* ran on shore. To quote again, from Captain Mahan's excellent volume: "It is sufficiently apparent, from the above accounts of the experiences of each vessel, that the failure of the greater part of the fleet to pass was due to other circumstances than the Confederates' fire. The darkness of the night; the stillness of the air, which permitted the smoke to settle undisturbed; the intricacy of the navigation; the rapidity of the current, then running at the rate of five knots; the poor speed of the ships, not over eight knots; were known beforehand, and were greater elements of danger than the simple fire of the enemy."*

It will be observed that all these runs past fortified positions were made at night. The *Queen of the West*, indeed, passed Vicksburg after daylight, and actually delayed under the fire of the batteries for the purpose of ramming a Confederate ship. But this daylight run was unintentional. Admirals Farragut and Porter evidently considered that ships had a better chance of slipping past in the dark, and to obtain the immunity from the enemy's fire which obscurity afforded, were ready to encounter the risks to navigation which are unavoidable in a night action. Their operations were carried on in a rapid stream, and in nearly every case the ships had to make a difficult turn while under fire. To criticise the solution of a tactical question, independently arrived at by two eminent seamen, is an unpleasant task. The Admirals had their work before them, and nobly performed their duty. Yet the results of their action show that the passage of a narrow channel in the dark was a mistake.

The case of a broad channel, which presents no difficulties of navigation, is different. At one time there was a project, strongly supported by owners of villas on the shores of the Firth of Clyde, of forming a line of defense between Uilean Point and the Cumbraes. Suppose that line of defense completed, and batteries of heavy guns established on both sides of the channel. Here, if a ship or squadron wished to force a passage, darkness or fog would be chosen. In clear daylight there would be a chance of passing without being hit. In even a moderate mist, still more in darkness, there would be a certainty of passing without injury. There being no danger whatever in the channel, all anxiety as to navigation would be removed from the mind of the commander.

Now, on the other hand, consider a position like Vicksburg fortified according to modern ideas. Not that the Confederates were behind their age; on the contrary, they were far ahead of it, as may be seen by the dispersion of the guns along the heights. Still, there would be some improvements. No water battery would be found unless it were a dummy erected for the purpose of diverting the fire of the ships from more important objects. Along the shore would be placed numerous electric search-lights, which would brightly illuminate the passing ships, dazzle the eyes of their captains, and at the same time render the guns on the heights above invisible. The search-lights on board the ships would only add to the confusion.

* "Navy in the Civil War." Vol. III.; p. 138.

Without exaggeration, it is not improbable that the search-lights, judiciously used, might alone prevent the passage of the ships, and that the latter would devote themselves, as a preliminary operation, to extinguishing the lights by machine-gun fire. Under these circumstances, would not an admiral prefer daylight to darkness? Would it not be better to expose ships to the enemy's fire than to run the risk of grounding under the batteries? Farragut's squadron, in the battle of Mobile Bay, suffered little from the fire of Fort Morgan. though he passed it in daylight. He lost many more men in his action with the *Tennessee* than from the guns of the fort. Here the channel was mined, but that did not stop the ships, though the monitor was destroyed. But mark the effect of obstruction. The *Brooklyn* recoiled from what appeared to her captain a nest of torpedoes. She was thus exposed to the deliberate fire of Fort Morgan, and suffered accordingly. The flagship pushed on and "passed with no great injury or loss of life." Before forcing a channel the effect of probable obstructions should be taken into consideration. But when the operation has been begun, and the ships are fairly in for it, the proper frame of mind for a commanding officer is, undoubtedly, that indicated by Farragut's "Damn the torpedoes! Full speed ahead."

The Mediterranean squadron, in 1878, passed the forts of the Dardanelles in a snow-storm, which rendered it difficult to see the next ship ahead or astern, and impossible to make out the land. The flagship ran on shore in a position which would have been awkward if the Turkish Commandant had had orders to dispute the passage. In this case the admiral had no choice as to weather.

However, looking at the matter from the artilleryman's point of view, no general rule can be laid down as to the probable time for an attempt of this nature. The passage of a clear channel, however strongly defended by batteries, may be effected at all times of day and night, and in any sort of weather. Ships can only be stopped by obstructing a channel to such an extent as to delay them under fire.

In all these instances, the immediate object of the attacking squadron was attained when the batteries had been passed. It must be clearly understood that the term forcing the passage of a channel does not mean forcing the entrance of a harbor. This is a very different matter, as ships affecting such a manœuvre are usually under fire after they have entered. The channel must lead somewhere, and there must be tolerably clear water, and an absence of artillery fire after the defenses have been passed. There are very few defended channels in this sense in the British Empire. The Holms, Port Philip, and, perhaps, Hong Kong and Halifax, are instances.

The immunity of batteries on high sites from damage by the fire of ships was shown on many occasions during the operations on the Mississippi and its tributaries. Thus Fort Henry, an earthwork on a low point, was taken by four armored and three wooden gunboats. A force of 10,000 men, under Grant, was present, but was not engaged. A few days afterwards, Fort Donelson, the main battery of which was 100 feet above the river, beat off the same force. The plunging fire of the upper battery was too much for the gunboats, though they appear to have silenced the "water batteries"

of the fort. At Arkansas Point, on a low site, the flotilla, assisted by a military force, was successful. At Grand Gulf a combined attack failed, as the gunboats were unable to silence the fire of batteries 75 feet above the stream.

Probably no coast fortification has ever been subjected to such artillery fire as that directed upon Fort Fisher in the two successive bombardments. "Fort Fisher consisted of two lines of works at right angles to each other. The land front ran across the sandy peninsula, which was here about half a mile in width, and mounted 17 heavy guns, bearing north, to prevent an attacking force from advancing in that direction." These guns were practically protected from a seaward fire, "by heavy bomb-proof casemates, with capacity for sheltering 4000 to 5000 men. The sea-front extended from the great battery at the angle of the two faces along a beach to the south-west, a distance of over three-quarters of a mile, and was terminated by a huge erection, 80 feet in height, known as the 'Mound Battery.' * * * On the sea face of the work were mounted 54 heavy guns, protected by traverses against enfilading fire, and some of these traverses were also bomb-proof. In the 'Mound Battery' were three or four 150-pdr. Brooke rifles, making the total number of guns in this formidable work 75. * * * One mile westward of the 'Mound Battery,' at the end of Federal Point, was a heavy armed earthwork, mounting six or eight 11-inch Dahlgren guns."*

Admiral Ammen gives the armament as 38 guns, which is more likely to be correct.† Probably Porter includes all the guns captured. The whole of the works were constructed of sand-bags.

The attacking squadron consisted of the *New Ironsides* and four monitors (one of which, the *Monadnock*, carried four guns in two turrets), three wooden frigates, and from 30 to 35 other vessels, ranging from heavy corvettes to armed merchant steamers. The armament of these vessels amounted in all to nearly 400 guns of all descriptions and calibres. The monitors carried 15-inch smooth-bores, which appear to have been by far the most effective guns used, as several of the heavier Parrott rifles burst during the first attack.

General Butler, who commanded the troops which were to assault Fort Fisher after the bombardment, proposed to operate on the nerves of the enemy before the attack by exploding a powder vessel, placed as near to the fort as the depth of water would permit. The navy had no faith in the efficacy of this mode of attack. The *Louisiana*, a small steamer, was prepared for the purpose, and loaded with 150 tons of powder. The craft was anchored in a position by a volunteer crew on the night of the 23d December, 1864. At 1.30 A. M. she exploded with a shock which was not felt by the attacking squadron, and did not disturb the garrison. The Confederates imagined that a blockade runner, laden with ammunition, had been blown up. The squadron weighed at daylight on the 24th December, and opened fire on the fort at 11.30 A. M. When all the ships had anchored and were engaged, about 250 guns must have been pouring in their shells at the rate of 115 projectiles a minute. After standing this fire for an hour and a quarter

* Porter; p. 694.
† "Navy in the Civil War." Vol. II.; p. 241.

the Confederates were driven to their bomb-proofs, and the fire of the fleet was then moderated. After firing for five hours the ships withdrew. With the exception of some men scalded on board the *Mackinaw*, a boiler of which was struck by a shell, the only casualties on board were the result of the bursting of Parrott guns.

On Christmas morning the transports with troops had all arrived, and it was arranged that the navy should again attack the fort, and that the army should land, and, if possible, assault. At 7 A. M. the fleet weighed, and engaged the fort while the army landed on the beach about five miles to the north, protected by a squadron of gunboats. The second day's bombardment of Fort Fisher was kept up for seven hours, and seems to have been deliberate target practice. The casualties on board were very few. Then began a difference of opinion between the naval and military commanders. Admiral Porter's report says: "I suppose about 3000 men had landed when I was notified they were re-embarking. I could see our soldiers reconnoitring and sharpshooting, and was in hopes an assault was deemed practicable. One gallant officer, whose name I do not know, went on the parapet and brought away a rebel flag we had knocked down. A soldier went into the works and led out a horse, killing the orderly who was mounted on him, and taking the dispatches from his body." General Butler says in a letter to the Admiral: "Upon landing the troops and making a thorough reconnaissance of Fort Fisher, both General Weitzel and myself were fully of opinion that the place could not be carried by assault, as it was left substantially uninjured by the navy fire. We found 17 guns protected by traverses, two only of which were dismounted, bearing up the beach. General Whiting, the Confederate G.O.C. of the district, states that the fleet disabled five guns on the 24th and four on the 25th.* He doubts the success of an assault at that time.

The navy was profoundly disgusted at the refusal of the military commander to assault the place. They argued that if the skirmishing line could advance unmolested to within 50 yards of the work the remainder of the troops could do the same. Admiral Porter wrote some very plain-spoken dispatches on the subject, the gist of which was telegraphed by the Secretary of the Navy to General Grant. The result was conveyed to the Admiral in a confidential dispatch, dated December 31st. which begins:

"Sir.—Lieutenant-General Grant will send immediately a competent force, properly commanded, to coöperate in the capture of the defenses in Federal Point."

Porter, however, was not content with official dispatches. He had written to Grant immediately after Butler's troops had re-embarked, urging him to send "other troops and another general."

General Terry was placed in command of the troops now told off for the attack on Fort Fisher. The fleet of men-of-war and transports left Beaufort on January 12, 1865, and on the 13th, 8000 men, with their stores and provisions, were landed, the disembarkation being effected in six hours. The presence of the *Brooklyn* and 17 gunboats prevented any resistance being offered to the landing. When the troops were safe on shore the fleet

* "Navy in the Civil War." Vol. II.; pp. 224, *et seq.*

stood in three columns and took up the positions shown on the plan. The bombardment lasted from 4 P. M. till dark, when the wooden vessels were ordered to withdraw, while the iron-clads kept up the firing during the night. On the 14th, all the small gunboats carrying 11-inch guns were ordered to take up positions commanding the northeast face of the fort, and to fire slowly and deliberately with the view of dismounting the guns opposed to an assault. This was kept up from 1 P. M. till the next morning. At the same time line No. 1 kept up a rapid fire on the same face to keep the enemy from their guns.

On the 15th, the fleet went into action in the morning, and had all reached their stations by 11 A. M. Their fire was kept up rapidly till 3 P. M., when by signal it was diverted to the upper batteries. At the same time 1600 seamen and marines, who had been landed for the purpose, attempted to reach the sea face of the fort, while the troops assaulted the northeast face. The landing party from the squadron was repulsed with heavy loss. The troops succeeded in establishing themselves in the work, and after some hours hard fighting from traverse to traverse, in which they were assisted by the fire from the ships, compelled the surviving Confederates to surrender. The loss of the garrison was 700 killed and wounded out of 2500. The gunboats prevented any reinforcements from reaching the fort.

The preliminary bombardment at the second attack was carried out with the definite purpose of silencing the guns on the northeast face of the work, or Fort Fisher proper. Porter's order was to fire deliberately. "Fire to dismount the guns, and knock away the traverses." "All firing against earthworks, when the shell bursts in the air, is thrown away. The object is to lodge the shell in the parapets and tear away the traverses in which the bomb-proofs are located. A shell now and then exploded over a gun *en barbette* may have good effect, but there is nothing like lodging the shell before it explodes."*

Forty thousand shell were fired during the bombardment. The supply was unlimited, and the ships had no difficulty in filling up with ammunition after each day's firing. Porter says that all the guns facing the ships "were dismounted or injured so that they could not be used, or the muzzles filled up with sand or dirt, which rendered them useless." Thus it is difficult to distinguish between permanent and temporary injury. As a land force was present, the question was of little interest to the fleet, for the main object was to keep the guns silent during the assault; and in this they were perfectly successful. In discussing the subject of naval attack on coast defenses, however, a gun choked with sand can hardly be termed "disabled."

The interest excited by the first encounter between iron-clad squadrons has caused the attack on the forts of Lissa to be somewhat overlooked. Yet the proceedings of the Italian squadron, previous to its naval action off Lissa, are not without interest. The engagement with the forts greatly affected the result of the subsequent engagement with the Austrian squadron. That result showed clearly that it is the height of rashness for a fleet to engage in operations against coast batteries when within striking distance of an enemy's fleet not greatly inferior in force. There were two fortified bays in

* General Order, No. 78. Porter; p. 718.

the island of Lissa—San Georgio and Comisa. Admiral Persano's plan was as follows: Rear-Admiral Vacca, with three iron-clad ships, to attack the batteries at Comisa, and to prepare for a landing, if it proved impracticable elsewhere. Vice-Admiral Albini, with the wooden frigates, to try to land the troops at Porto Manego, after silencing the batteries at San Vito, which defended it. The Commander-in-chief, with the bulk of the fleet, to attack the batteries of San Georgio. The ships moved into position at dawn on the 18th July. San Georgio was attacked by eight iron-clad ships, and according to the official Italian report, at half-past one in the forenoon Fort San Georgio and all the outer fortifications of the port were silenced, with the exception of the telegraph tower, the height of which was too great to allow the ships to batter it effectively. This exception is worth noting. The *Formidabile*, *Maria Pia*, and *San Martino* were ordered to enter the port and engage the interior batteries. In the meantime, Admiral Vacca had been obliged, on account of the elevated position of the batteries, to abandon the attack on Porto Comisa and joined Admiral Albini, who also on account of the high positions of the shore batteries, had not succeeded in his attempt on Porto Manego. Both of these squadrons then rejoined the Commander-in-chief. At 6 P. M. Admiral Vacca's squadron kept up the fire on San Georgio, and the remainder of the squadron formed line. In the meantime, the gunboats had cut the submarine cable between Lissa and the mainland; had destroyed the semaphores; and had intercepted a message from Trieste stating that the Austrian squadron would leave Pola that evening. This intelligence was incorrect. Tegethoff had no intentions of putting to sea until he was convinced that the Italian attack on Lissa was serious.

On the morning of the 19th the iron-clads of Admiral Vacca's division, and afterwards the wooden frigates, were ordered to attack the batteries which the enemy had repaired during the night. In the meantime the *Affondatore*, with two wooden frigates and a corvette joined, bringing up the number of troops to 2200. Persano then decided to land. The unarmored ships and gunboats were to protect the disembarkation of troops The *Terribile* and *Varese* were ordered to attack Porto Comisa, in order to occupy the garrison of that place, and to effect a diversion. The other iron-clads were directed to attack San Georgio. At three o'clock the attack commenced. The *Formidabile* entered the harbor and engaged the castle battery at a range of 300 metres, receiving a heavy fire from that work and from another battery on the south side of the entrance. To support this ship Admiral Vacca entered the harbor and silenced the battery which was raking her. His squadron then left the harbor, followed soon after by the *Formidabile*, "covered with glory." In the meantime, the wind had freshened to such an extent as to impede the disembarkation, which had barely been begun. The landing was put off till next morning, when the appearance of the Austrian squadron put a stop to further operations. The *Formidabile* was struck by 90 projectiles. Though none of her plates were perforated, they were indented, and, in some cases, bent. The ship was not in a condition to take part in the naval action, and was leaking when she afterwards arrived at Ancona.

The experience of Lissa is not calculated to encourage any naval com-

mander to engage in an attack on shore defenses when he may at any moment be called upon to fight a naval action. When Persano attacked Lissa he knew that Tegethoff was only 150 miles off, say 20 hours. The Italians had 12 iron-clad ships against the Austrian seven. Their unarmored force was about equal to that of the enemy. Taking into consideration the probability of the appearance of the Austrian squadron on the scene, ordinary prudence would appear to point out the necessity of keeping a force equal to that of the enemy ready to act against them. Admiral Persano's force was insufficient to furnish a covering squadron ready to fight the Austrians, and at the same time to carry on operations against Lissa. He was, consequently, forced to begin a naval action with his ships separated, some covering the disembarkation of troops, some actually engaged with batteries.

It has been contended by Admiral Colomb, whose opinion on any point of naval history naturally carries great weight, that Admiral Boüet-Williaumez, in command of a fleet vastly superior to that of his enemy, "yet would not risk the simple bombardment of an ill-defended coast town, Kolberg, because of possible interruption at the hands of the inferior German squadron, which was 700 miles distant." * If the French admiral considered that by bombarding Kolberg he could induce the German squadron to leave port and fight him at sea, he would have been amply justified in attacking the place. The most probable explanation of Boüet-Williaumez's conduct is that given by Admiral Bourgois, who says that Kolberg was spared, not from apprehension of the arrival of the German squadron, but because of the reprisals which such an operation would inevitably have entailed on the French towns in the possession of the enemy. "Sans utilité pour nos operations dans la Baltique, il eût provoqué de sanglantes représailles sur notre territoire envahi, et infligé au pavillon français une tâche ineffaçable." †

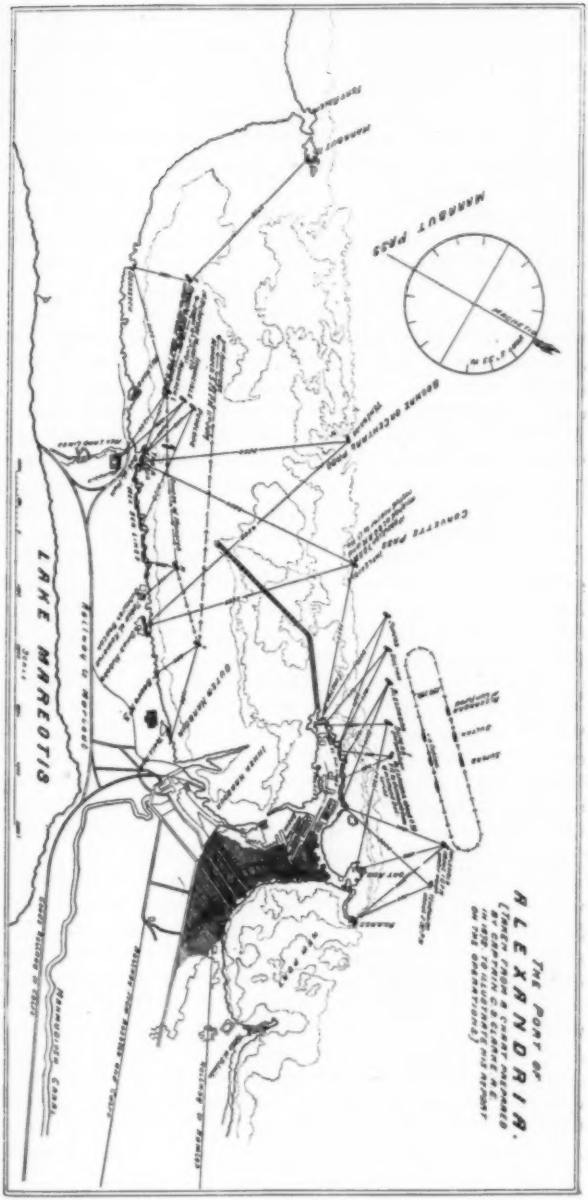
Simple bombardment does not entangle a fleet in any way, or render it less fit for a sea fight unless the expenditure of ammunition is excessive. Ships seriously engaging coast batteries, on the other hand, must sustain some damage, and the crews must be more or less exhausted. A squadron, under these conditions, is not fit for action against an enemy of approximately equal force, whose ships are whole, and whose crews are fresh.

The consensus of naval opinion appears to be that no naval attack on a fortress will be made unless the officer in command of the attacking force is absolutely free from fear of interruption. He may be so strong as to be able to deal with an enemy's squadron as well as with his fortifications. He may be in such a position that serious interruption is impossible. If so, he will be under no apprehension of interference, and may possibly attack. If this principle is accepted, it follows that while any attack on a defended port in the United Kingdom is in the highest degree improbable, an attack on a distant coaling station might possibly be made by an enemy who was prepared to risk his ships to little purpose.

The bombardment of the forts of Alexandria gave an excellent opportunity of comparing different methods of manœuvring ships when attack-

* JOURNAL U. S. INSTITUTION. Vol. XXXIII.; p. 161.

† *Les Torpilleurs.* Vice Admiral Bourgois.


LAKE MAREOTIS
MARABOUT PASS
THE PORT OF ALEXANDRIA.

ing batteries. The *Invincible* and *Penelope* remained at anchor during the whole engagement; the *Monarch* steamed backwards and forwards in a line parallel to the shore. The *Sultan*, *Alexandra* and *Superb*, at the beginning of the action, engaged under way, steering an elliptical course past the light-house batteries at a distance of about 1500 yards. After passing the batteries twice in this manner they anchored, shifting their positions as requisite. This plan was also followed by the *Temeraire*. The *Inflexible* dropped a small buoy at a known range, and steamed up to it to deliver her fire.

According to Captain Goodrich, of the U. S. Navy, who was an eye-witness of the engagement, the prize for good shooting must be awarded to the *Inflexible* and *Temeraire*. Both of these ships fired at known ranges only, while the captains of the principal guns on board both ships had the advantage of a clear and uninterrupted view. The plan of fighting a ship under way was evidently the worst of the many adopted. Sir W. Hunt Grubbe, who commanded the off-shore squadron, only tried the elliptical course in line ahead twice. He then anchored his squadron, to get more accurate shooting. The Egyptians did not use the few mortars mounted in their works, and would have produced no effect had they fired them. In the absence of high-angle fire, the ships could anchor with comparative impunity, and the action resolved itself into deliberate shooting at the enemy's guns. The ships engaged belonged to the Mediterranean squadron, and it is, therefore, needless to say, were in a high state of efficiency. The gunnery may certainly be taken as above the average. The effect of the fire may fairly be regarded as a standard of what can be done by ships against batteries under exceptionally favorable conditions for the former. The failure of the percussion fuses, no doubt, greatly diminished the amount of damage done to the works themselves, but, probably, did not greatly affect the damage to guns. The *Inflexible* engaged Oom-el-Kabebe at a range of 3800 yards. Her practice is described on all hands as admirable. As the fort was only 80 feet above the sea, and was protected by a parapet eight feet high, her shell struck with a descending angle, and had some searching-power. As a result, one S. B. gun was disabled, and this gun was not in action, while the damage to the parapet could have been repaired in a very short time. So much for the effect of slow fire from heavy guns at long range.

Mex, which has been described by Major Clarke, R.E., as a "prehistoric work," was attacked at short range by the in-shore squadron, assisted by the *Temeraire*, outside the corvette pass. "In view of the tremendous fire to which Fort Mex was subjected, and the comparatively short range at which all the ships, except the *Temeraire*, engaged it, it is also impossible to believe the fact that not a single gun here was dismounted or disabled during the action proper. * * * The 8-inch gun * * * was bowled over by the *Penelope* long after the fort had ceased firing, and from a distance stated to be about 300 yards." So says Captain Goodrich, in his official report on the action. The men in Mex were, however, driven from their guns, which were then disabled by a landing-party, who destroyed the carriages of two heavy guns by exploding gun-cotton, and spiked the remainder. This was an excellent piece of work; well conceived, well carried out. But

Egyptian troops, or men of a similar stamp, are necessary for the success of such an enterprise. Most men will run away on occasions, but those with some grit in them can be brought up to the scratch again. The scanty protection given to the gunners at Mex gave them ample excuse for leaving their guns, but the landing-party should not have been permitted to effect their purpose without interruption.

On the day following the bombardment the forts were in a position to renew the action, and the ships had expended a large portion of their common shell. The garrison, however, was demoralized, and, so far as the ships were concerned, the affair was over.

It has been remarked that the fire of ships of the modern type carrying a small number of heavy guns, is not so effective as that of older vessels, carrying a large number of guns. At Charleston, the ironsides proved superior, offensively, to the monitors. The *Minotaur*, *Agincourt*, and *Achilles* might, probably, have been more useful vessels than the *Inflexible* for the attack on Alexandria.

* * * Raids on minor coast defenses were frequent in the days when the effective range of musketry did not exceed 200 yards.

A very successful harrying system of operations was carried on by our frigates and smaller vessels during the great war, especially on the Mediterranean coasts of France and Spain. This kind of work, partaking largely of the nature of a spree, seems to have been very congenial to our seamen. Moreover, it filled their pockets. Insignificant ports were protected by small batteries. Probably no one would have thought it worth while to expend ammunition in attacking these works for their own sake, but the enemy's coasters occasionally took refuge under them when chased by our cruisers. Our craft would then open fire, and would frequently land a force and rush the battery, as the quickest and most effective method of silencing it. The garrisons of these minor coast works were composed to a great extent of invalids and pensioners, and our landing-parties were frequently successful. Sometimes regular troops were at hand in sufficient numbers to beat off our men, but even then the loss was seldom heavy, as the fire from the ship covered the re-embarkation of the men. These constant worrying operations had a distinct military value. Telegraphs and signal stations were destroyed; supplies sent to sea were cut off. A whole district might be kept on the *qui vive* by the raids of a single ship. The exploits of Dundonald are well known. It is said that the *Imperieuse*, under his command, found employment for 10,000 of the enemy. Probably that is an exaggeration, but there is no doubt that his proceedings were a constant annoyance to them.

Poker was not invented in those days, but bluffing was frequently used with great effect. At Fort Manack, Java, Lieutenant Lyons landed in August, 1812, with 35 men of the *Minden* and stormed the battery. Finding the Dutch garrison drawn up to receive him, Lyons called out that he had 400 men and would give no quarter, on which the Dutch ran. The *Minden* spiked the guns and destroyed the fort. The Dutch made an attempt to retake it, but were driven back; and the British, when their work was finished, re-embarked.

* * * The following description of an attack by the French on the Chinese entrenchments at the mouth of the Tam Sui is abridged from an account which appeared in the *Figaro*: "The squadron of Admiral Lespes, consisting of *La Gallissonnière*, *Triomphante*, *D'Estaing*, and *Vipère*, arrived off the river Tam Sui on the 1st of October. The two iron-clads and the cruisers anchored at a distance, while the gunboat reconnoitred the mouth of the estuary. The river was obstructed by a line of four large junks, loaded with stones, and sunk outside the bar, leaving a channel which appeared to be defended by ground mines. On the 2d a reconnaissance of the coast was made. On the 3d fire was opened on the forts. The Chinese returned the fire, but at 2 P. M. the forts were silenced. The 4th and 5th were spent in reconnaissances. On the 6th the *Duguay-Trouin*, *Chateau-Renard*, and *Tarn* arrived, the latter bringing the landing-party of the *Bayard*. On the 7th the weather was bad, and the sea too high to admit of landing. On the 8th, at 9 A. M., the landing-parties of all the ships disembarked in a small bay near the mouth of the river and attacked the Chinese position. The Chinese appear to have fought well, as they generally do behind entrenchments. Captain Boulineau 'judged it prudent to stop the advance.' The sea was getting up. The French retreated, leaving their dead behind them. Out of 320 actually engaged 18 were killed and 51 wounded."

Probably a better instance of how not to do it could not be cited. Suddenness—if possible, surprise—is essential to the success of a landing-party from ships. At the Tam Sui the repeated reconnaissances taught the Chinese exactly what they had to expect, and gave them time to bring up their men. The French never reached either of the forts, or the entrenched camp; they were checked at an embankment considerably in advance of those works. The French seamen appear to have been entangled in the paddy fields, and to have been shot down by the Chinese from under cover.

As a general rule, the success of a landing-party implies an insufficient garrison, want of vigilance, or want of pluck on the part of the defense. The landing force of a squadron is never large. At our home ports, including all mercantile ports of any importance, the force available for defense against a landing must always be ample to resist any purely naval attack. Unless, indeed, the volunteers are bottled up in fortresses, or employed in throwing up earthworks for the defense of London. However, it is not upon the shores of the United Kingdom that raids are to be feared. If this country retains command of the sea, no enemy's cruiser will run the risk of being caught with half her crew away in boats or on shore. If we lose the command of the sea, the enemy will have other business on hand than looting watering-places. In some of the minor colonies, especially at those places where the English population is small, an enemy's squadron may be in a position to land a force considerably superior to the defense. A naval raid for the purpose of exacting contributions, or destroying shipping and stores, may possibly be made. In these cases vigilance is of supreme importance. Everything depends on bringing the enemy under fire while they are in their boats. The boats must inevitably be crowded with men, and every bullet should tell. The few minutes of confusion inseparable from a landing should also be a golden opportunity for the defense. Coast batteries are occasion-

ally constructed, as at Breandown, with an elaborate gorge defense, but with no obstruction in front, to prevent men landed on the beach walking in over the parapet. Seamen are handy at getting over obstacles, but they also swear on small provocation. Impediments, sufficient to produce objurgation, and thus to prevent surprise, may be easily improvised; and surprise has been generally the principal element of success of landing-parties.

In all cases of naval attack the object of officers commanding coast defenses is to impede and annoy the enemy's squadron. Rules for particular cases cannot be laid down, but a careful study of actions between ships and batteries will give a general idea of the course to be pursued in order to increase the difficulties which are inseparable from sea gunnery, and to make accurate fire from ships impossible. There is, as yet, no accurage range-finder afloat; and though some promising ideas are being worked out, there seems no immediate prospect of a trustworthy instrument. In the absence of means of quickly ascertaining and communicating the range, any rapid movement on the part of the attacking ships is out of the question; or, if carried out, must entail bad shooting and waste of ammunition. The numerous instances already given show that to maintain an effective fire a ship must be at anchor. The excellent practice made by the *Inflexible* at Alexandria may be quoted in opposition to this theory, but the peculiar armament of that ship must be taken into account. The *Inflexible* carried four 16-inch R.M.L. guns, and eight 20-pounder R.B.L. guns. The lighter guns were, therefore, wholly insignificant in comparison with the heavier. The ship carried no secondary armament, in the sense in which the term is now understood. The four heavy guns took some time to load, and their fire was naturally delivered in salvos, with considerable intervals. The policy of keeping the ship moving, and steaming to an ascertained position to fire, seems to have been the natural outcome of her armament. Such a plan would probably not have been followed had she had a secondary armament of 6-inch guns, such as is now usually carried by battle-ships. The object of the defense is, then, to prevent ships from anchoring, by making it so hot for them that they must shift their position or be disabled. Where howitzer batteries exist, this should be a simple operation. The engine and boiler of a ship are protected by a steel deck, which is fairly shell proof; but no such overhead protection is given to the armament. High-angle fire from rifled howitzers should be accurate, and even that of old 13-inch mortars is not to be despised. A howitzer battery cannot be silenced, or even inconvenienced, by the fire of ordinary men-of-war. In the absence of howitzers or mortars—or in conjunction with them—it is a good plan to concentrate all the fire, as much as possible, on one ship, and to drive her out of action. This was done with success at Fort Wagner, the garrison of which work had great experience in dealing with ships.

If the object of the enemy is to force the passage of a channel, obstructions must be placed in his way. Artillery fire, in this case, should be regarded as auxiliary—a most important auxiliary no doubt, but unable alone to prevent an enemy from passing. Passive obstructions, to be effective must be practically immovable. Floating booms are, as a rule, destroyed without great difficulty.

A channel was cleared at the forts below New Orleans, where ships chained together were moored across the stream; on the other hand, at the second attack on the Peiho, where the river was staked as well as otherwise obstructed, our vessels were stopped, and sustained a disastrous defeat. Difficulties of navigation should in all cases be taken every advantage of by the defense. A bend in the channel where ships must turn may be sufficient to impede a squadron, if means are taken to obstruct the view of the captains and pilots of the ships. Smoke is useful in such places, and as we are within measurable distance of smokeless powder, other means of producing it may have to be used. The fires on the banks of the Mississippi at Port Hudson were primarily intended to show up the enemy by their light. As it turned out, their smoke proved more effective than the projectiles from the batteries. The days of fire-ships ended with the universal adoption of steam; perhaps, in attacks on forts, smoke ships may take their place. Navigation in narrow water, under ordinary circumstance, requires great care and constant attention. No great effort of imagination would seem to be necessary to picture the position of the captain of a ship when, in addition to all ordinary difficulties of pilotage, his view is obscured by smoke, landmarks are invisible, and the compass is useless, owing to the concussion of the ship's gun. Surely these are sufficient to bother a man of average capacity, without calling in the aid of artillery fire. Yet the possibility of ships running through such a channel as the Narrows at Bermuda, with the buoys removed or misplaced, by simply observing the color of the water, has been gravely maintained.

Since the defenses of Alexandria were attacked, gunmakers and artillerists have advanced in two directions. The first of these—the development of quick-firing guns—is temporarily in favor of naval attack. According to the theory advanced in this paper, ships never effect anything against works or guns, but only against gunners. Any invention which increases the rapidity and accuracy of fire is of more importance to seamen than an invention which increases the power of guns. The method of mounting quick-firing guns has greatly improved the shooting from a moving platform. Rapidity of fire has, of course, been increased by their adoption. All naval Powers have recognized these facts, and have mounted large numbers of quick-firing guns in newly fitted ships. These guns are in no case placed behind armor; if protected at all, their shields are only proof against machine gun bullets. Their fire should, therefore, easily be kept down by similar guns mounted on shore, the detachments of which would be far better protected than their adversaries afloat. The advantage that this invention has conferred on ships is, therefore, merely temporary. The fact is that the ships have the guns and the forts have none.

The other point referred to is the adoption of high explosives for the bursting charges of shell. This is altogether in favor of the defense. Whether these shells are to be fired with slow-burning powder or by compressed air matters little. The universal introduction of high explosive bursting charges will probably have the same effect on the question of ships *versus* forts that the introduction of shell produced in the days of wooden vessels. Special ships will, more than ever, be required to attack coast defenses.

If it be admitted that no serious naval attack on a fortress can be attempted, except by a Power possessing uncontested superiority at sea, it follows that this country is less liable than any other to such attacks. The increased speed of war vessels has in no way affected the question as regards organized attacks, though it has, perhaps, made a sudden raid a more feasible operation than in former days. If so, it has to an equal extent enhanced the chance of a cruiser being intercepted while engaged in a raid.

As far as the United Kingdom is concerned, a raid on an undefended port is possible, but any organized naval attack on a fortress is out of the question. Coaling stations abroad, especially those of secondary importance, such as St. Lucia or Thursday Island, are more open to attack; for at these distant stations it is possible an enemy may, in a particular locality, be temporarily superior to us at sea.

Coast fortifications are essentially the defense of a weak against a strong naval Power. By Great Britain they should be regarded as a necessary evil—necessary so far that our arsenals at home and abroad must be secured against naval attacks, and our coaling stations and great mercantile ports must be protected against raids—an evil, because every shilling spent in works of defense represents an equivalent reduction in our aggressive strength, and every gun mounted in a fortification takes 50 men from the fighting line.

Coast fortifications should, then, be strictly limited to what is absolutely necessary, and every tendency to exceed this limit should be resisted. Disappearing guns and rifled howitzers—neither of which can be silenced by men-of-war—long-range guns, high explosives, and submarine mines, have enormously increased the difficulties of naval attack, and have rendered gigantic armaments unnecessary. Let it always be remembered that the sole *raison d'être* of the coast defenses of the Empire is to allow the navy and army to act on the offensive, and fight out a quarrel on the high seas, and in a hostile country, rather than on British soil.

METHOD OF COMBAT FOR AN INFANTRY BATTALION ON THE OFFENSIVE.*

By CAPTAIN WALDOR DE HEUSCH, of the Grenadiers.

Professor in the Military School at Brussels.

Translated by First-Lieut. James S. Pettit, First Infantry.

THE method of combat for infantry to-day is based on the necessity of *rapidly* attaining a position near enough to overcome the fire of the defense, and to profit by the trouble this fire preparation will cause in its ranks, by rushing forward to the assault. Everything should concur in hastening this movement as rapidly as possible, from the battalion up to the distance at which the fire has its full effect.

* *La Tactique D'aujourd'hui.*

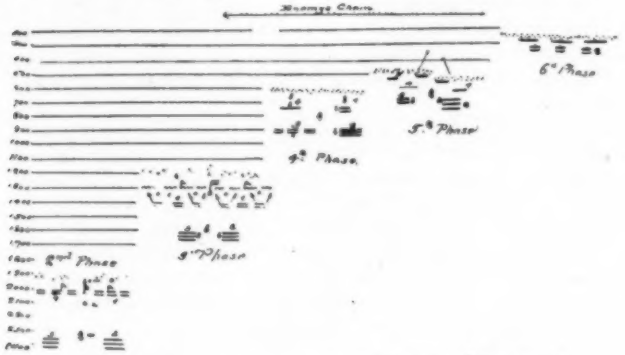
Although our (Belgian) rule recognizes only two great phases in combat, the *preparation by fire*, and *the assault*, it is perfect, for to push the ruling farther would be dangerous. We subdivide *the preparation* into six phases, a truly theoretical division, but its object is to make our method of combat in the offensive thoroughly appreciated.

FIRST PHASE—FORMATION OF COMPANY COLUMNS.

The battalion having arrived in the zone, still distant from artillery fire, we abandon the battalion columns for the company columns, which permits easier marching and diminishes the losses.

When the artillery fire reaches a certain efficacy, the company columns must be abandoned. With the shrapnel fire of to-day, this must be done at from 2500 to 3000 metres, the batteries of the defense will then be visible, also the general direction of the enemy's position.

We will then be at from 2000 to 2500 metres from the enemy's skirmishers who will in general be found at 500 metres in front of their batteries.



Preparation for the attack of a battalion (Belgian)

Our artillery accompanying the troops should now engage in the duel with that of the defense and draw its fire.

This is the moment for passing to the

SECOND PHASE—OR THE PREPARATORY FORMATION FOR COMBAT.

The march in company columns must now be abandoned, these columns being too massive—we must take the dispersed order, but we are still too far away from the enemy to take the formation for combat—our rule prescribes an intermediate formation—which is the *preparatory formation for combat*.

It permits us to preserve the tactical line, to gain ground rapidly to the front, diminishes losses, and allows us to quickly take the formation for combat.

We immediately halt the company columns. The major designates the companies which are to compose the advance line, and these form in line of platoon columns.

The two other companies of the battalion retain the company column formation.

The companies of the advance line, when they have gained about 150 metres forward detach four men from the wings of each platoon under the charge of a non-commissioned officer to form the scouts, which gives four patrols of four men each to be directed by two non-commissioned officers, who will receive their instructions from the battalion adjutant.

The scouts having gained 150 metres to the front the advance line takes up the march.

The color-bearer marks the centre of the battalion, he is directed by the adjutant under the orders of the major.

The guidon of each company marks the centre of the front of combat for the company (150 metres).

When the advance line has gained 300 metres, on the battalion reserve, the latter takes up the march, and the battalion advances preceded by its scouts who perform a veritable *service de sûreté*.

Let us examine this preparatory formation. The formation in platoon columns is excellent; it diminishes vulnerability. In France it is employed for the four companies of the battalion from the first phase. Objection has been made to the line of platoon columns, that a line thus constituted is difficult to direct, but we must remember that each little column is under the orders of an officer, and the captain can direct them from some metres in rear. In the provisional rule of 1885 it was prescribed that these columns should take intervals so as to occupy the front of combat of the company (150 metres). To give more cohesion, they have now directed that the columns take intervals equal to platoon distance, it renders them more easily handled, but increases the chances of loss.

Lastly, these platoon columns allow the formation for combat to be rapidly effected. It is only necessary to advance the two wing platoons, the third remaining in rear as company reserve.

As for the scouts, they prevent surprise, explore the ground in front, and give information of the enemy.

They give security to the forward march of the battalion, as the advance guard does for the column.

I have heard the fear expressed, that the chain would fire into the backs of the scouts, but in principle the battalion on the offensive only uses its fire at the effective distance of 600 metres, and at this moment the scouts take their places in line and become skirmishers.

Even in open ground, these scouts are useful, for there are always undulations; but their rôle is most important when the ground is uneven, rough or concealed.

THIRD PHASE—FORMATION FOR COMBAT.

We pass to the formation for combat after we have penetrated a great distance into the field of fire, or at about 1400 metres where the polygon of fire gives 10% of successful shots.

The major warns the captains of the advance line, and they command *Formation de Combat*. The sections of the wing platoons move forward, and occupy the space allotted to each company. The head sections place

themselves next to the guidon and the rear sections on the outside of the head sections, and at some paces to the right or left. (See drawing.)

During these dispositions, taken on the march, the scouts continue their service forward, and the company reserve (a platoon) which had halted takes up its march 150 metres in rear of the centre of the chain.

The battalion reserve approaches to within 200 metres of the company reserves, and follows them at this distance. The maximum depth then in open ground is 350 metres.

We march in this manner to about 800 metres without firing. The losses the attack can hope to inflict on the defense between and 600 and 1400 metres, are of little importance, the value of the offensive moreover is in *movement* and fire implies *immobility*.

The partisans of infantry fire at long ranges ought to give up the idea, it must be abandoned in the *offensive*.

Colonel Von Löbell in his "Revue annuelle militaire" of 1880, made this very characteristic remark, "That voices are raised in favor of fire at great distances only *in small armies*, while in large armies conscious of their strength entirely opposite tactical principles are followed."

Up to the effective fire of infantry (600 metres about) the preparation by fire is made only by the artillery. This kind of fire by infantry has no useful effect, not to mention the waste of ammunition. Exceptionally favorable circumstances might arise; the distance being known by communication with the batteries, and the ground offering a shelter from which salvos might be fired on the enemy's batteries, or on troops in motion in open ground. But as a rule the infantry ought only to count on fire at short ranges.

The Belgian rule admits no exception.

The best means of avoiding losses by fire is to advance with the greatest possible rapidity towards the defense, you are then in the true spirit of the offensive and can preserve the moral ascendancy.

FOURTH PHASE—OPENING OF FIRE. THE ADVANCE BY BOUNDS.

From what has preceded, the opening of our fire ought to be delayed until at 400 metres. But when the chain has reached the 600 metres zone, and it finds itself in open ground, (which is the case examined here) the fire of the defense becomes murderous and it is necessary, indeed indispensable, to respond.

From this point on, the ground being beaten by projectiles, the attack must renounce the ordinary march and throw itself forward by bounds at the *pas de course*. The scouts should halt at about 600 metres from the enemy's chain, and our chain should continue its march up to this distance. The front rank deploys forward at four paces normal interval, and at the command "Halt" the men of the second rank occupy the middle of the intervals between the front rank files. The scouts return as skirmishers to their sections. The sergeant-major places himself at the disposition of the major as do also the adjutant and the marker. The company guidons join the captains, and their mission is now to indicate the rallying point for the company. As the attack progresses the guidon should be taken from the

piece, until the moment the captain orders a rally, so as not to indicate to the enemy, the location of the captain.

The forward march by bounds, employed to cross rapidly open spaces beaten by heavy fire ought not to be executed, as certain tacticians have proposed, by groups of skirmishers under the protection of the fire of a neighboring group, as for example, throwing forward alternately the odd and the even numbered groups.

We have already shown that such a manœuvre under fire cannot be executed.

In Germany, the bounds are executed by the entire chain at once.

During this phase, we must execute *fire as skirmishers*, and you will all agree that it will be very difficult to determine the number of cartridges to fire after each bound, so we prefer our provisional regulation of 1885, which fixes the number habitually at three without command.

From custom and training the skirmishers will mechanically hold to this number.

It has been calculated that bounds of 50 metres are about correct, to maintain cohesion, and to allow the men to take breath.

Calculation and experience have shown that the defense can fire two cartridges on the chain during the execution of each bound.

We can then gain ground to the front beyond 600 metres only at great sacrifices. In consequence, the vigorous application of the principle of Frederick II. has been proposed, viz.: to march forward rapidly without firing.

But the intensity of the fire of the defense causes an emotion in the assailants which must be overcome by allowing them to reply to the fire. Besides, halts in the chain are absolutely necessary to allow rest and to recover breath, and to prevent the troops arriving say at the 300 metres line absolutely "blown."

It is certainly better to profit by these short stops by allowing the men to fire. This helps sustain their morale, causes losses to the defense and protects the advance of the neighboring company.

FIFTH PHASE—MARCH AND REINFORCEMENT OF THE CHAIN UP TO THE OPENING OF THE RAPID FIRE.

After the opening of the fire the losses are sensible, and the company reserve which ought to diminish its distance during the movements of the chain, will also feel them. At what moment then ought it to be thrown into the chain?

Our rule says, that an entire section ought first to be thrown into the chain, *to augment the intensity of the fire*, then a second section *to give the line a new impulse*. This is prescribed on smooth ground at 500 and 400 metres respectively.

Let us look at this disposition. In the first place the reinforcing of the chain should not have for its object so much the increase of fire, as the increase of the propelling power of the line. For we must not forget that the attack must struggle vainly with the defense so far as fire is concerned, it is *decision* and *movement* that must make it triumph.

Now, will the introduction of a section be sufficient to carry forward the hesitating chain? We must carefully consider the situation in combat, and to this end we must consult writers who have been witnesses of this kind of an engagement.

The reserve platoon held at 150 metres in rear of its own company will have suffered losses not greatly inferior to those of a platoon in the chain.

It will not then, be *too large* to give a serious impulse to the chain of which *the forward movement will already have become difficult.*

As stated in our provisional rule. Art. 529 School of the Company.

Let us add, that we should try in vain to keep one section one hundred metres behind the chain, while the five other sections of the company were in the thick of the fight. The men would *rush forward*, according to the words of a French writer, for, reached by the bullets, they would wish to be firing with their comrades in revenge.

General Brialmont says on this subject, that at 500 metres the chain will be forced to halt, to retake breath and to re-establish connection between its elements.

In the method of attack he has proposed this wise general reinforces the chain at 500 metres by *all of the platoons at once.*

It seems to me preferable, for the reasons stated, to throw the *entire* reserve platoon into the chain at once, and *by doubling*, after the second or third bound say at 500 or 450 metres, but before reaching 400 metres. The reinforcing by doubling seems to me the only practical one.

In the battalion as formed, there is no room to extend the chain by prolonging it, since the front of combat is limited, moreover, that kind of reinforcing does not give any propulsion.

As to intercalating a section, or a platoon by opening the intervals, it is absolutely theoretical and must be renounced.

The attempts to reinforce the wings by prolongation and to reinforce groups in the intervals by closing to the right or left, has all arisen from an exaggerated desire to avoid *a mixture of units.*

In our opinion this has been pushed too far. The company is a single family of which the captain is the father, and every officer and non-commissioned officer ought to be obeyed in one platoon as faithfully as in another. Moreover what is the good of wishing to avoid a mixture of sections and platoons in the same company, when we are certain that in a few minutes there will be a mixture of companies in the battalion, battalions in the regiment or even of regiments? We must accept this inevitable consequence of combat to-day, which is a succession of movements in the direction of depth. At the moment this reserve platoon enters the chain, we must reconstitute it.

One of the companies of the battalion reserve ought to be found at this moment at 100 metres from the skirmishers.

The major will utilize the platoons of this company to sustain the march by pushing in an entire platoon at once. Supposing the first reinforcement to have taken place at 500–450 metres by means of the third platoon, there will yet remain three or four bounds to make it arrive at 300, 250 or 200 metres. After the second bound he can introduce a platoon, and so on at

each ulterior bound. In France they have ruled the methodical reinforcement of the chain alternately by wings. Seducing as this theory is, I believe that the circumstances of the struggle alone must determine the moment at which the platoons should be thrown in and also the point at which reinforcements should take place, I prefer very much the elasticity of the Belgian rule, which leaves the major judge of the situation.

SIXTH PHASE—RAPID FIRE.

The rapid fire must open the way for the attack, and bring trouble to the defense by its intensity, and that is why our rule has based the front of combat on the necessity of putting into action at the opening of this phase one rifle for each 65 centimetres in the line of fire. In France they want to have twice as many guns in action, their front of combat (232 metres) is based on 3 guns per metre, and the four companies are in the chain.

The rapid fire will open normally in the zone of *short distances*, which begins at 300 metres, but if circumstances will permit, we should approach nearer, say 200 metres or less, so that we may be in position for the rush upon the enemy's line after some minutes of this fire, if he still holds it.

It is of the greatest importance to fix bayonets, at all the exercises *before beginning the rapid fire*, so that if the command is not given the men will execute this movement themselves, for once the rapid fire is begun all individual action of the chiefs will be of little avail, and the emotion of the soldier is at its height.

To make this force of habit, would it not be better to suppress the command fix bayonets, as prescribed in articles (312 and 398), and to direct that this motion be an integrable part of the rapid fire?

Some tacticians propose to fix bayonets at the opening of the fire at 600 metres, for my part I much prefer this method. It is quite urgent that after the rapid fire the bayonets should scintillate at the ends of the rifles. By fixing them at 600 metres, we are certain of being able to execute it. At 200 metres it may not be possible.

We give no value to the objection, that the accuracy of fire is influenced, that the arm is heavier, etc.

It is high time to give to the bayonet its due importance. At this moment there can be no question of economy of ammunition, we are obliged to succeed or beat a retreat, which means destruction. We have taken many precautions in economizing cartridges so as not to be out at this sharp crisis. A supreme effort must be made to overthrow the assailant and make him fly from the living crater before him.

The dark cloud of smoke has its utility. It deceives the soldier as to the effects obtained by his fire, by comparison, much inferior to that of the defense, and it conceals him from the eyes of his adversaries at the precise instant when electrified by his chiefs, pushed by the échelons in close order which are aiming from the rear, he is going to attempt the decisive attack with the bayonet.

The duration of the rapid fire cannot exceed three or four minutes at most. To prolong it beyond this limit, tacticians say, is to carry the

nervousness of the men to its highest pitch, and they will throw themselves forward or retreat, notwithstanding the chiefs.

It should be repeated to men incessantly during peace, that the retreat at this moment is more dangerous than the advance.

At the opening of the rapid fire, as we have said above, three companies at least, and possibly four, are in chain, and what remains of the battalion is 100 metres, at the most, in rear.

The six phases of the preparation are shown in the diagram.

GUN-COTTON AS A MEANS OF ATTACK.

(*From the Royal Engineers Journal, March 2d and April 1st*, 1891.)*

THE German War Department has for a long time past been much occupied with the question of how to master the French *forts d'arret*, which hermetically close the eastern frontier of France up to the limits of the well-known gaps between Verdun and Montmedy and Toul and Epinal; this subject, moreover, still occupies its attention.

From the German point of view, therefore, the question is how to provide a projectile which shall be able at once to penetrate the cover in the French forts, and thus to put out of action both their garrison and their guns?

For this purpose is required not only a new common shell, but above all a new and especially strong and effective explosive as a bursting charge for such a shell. It is no longer a secret that during the past autumn and winter, at the experiments made with this object at the Kummersdorf ranges, near Zossen, the German 6-inch ring guns and the short 8.4-inch guns succeeded, with their powerful bursting charge of gun-cotton, in piercing with annihilating effect the cover of the forts which were built there for this particular trial, and of which the main features were considered to be exactly those of a French *fort d'arret*; they penetrated even into the best protected spaces, viz., the shell filling rooms.

The study of gun-cotton and its properties has occupied the artillerist for a long time past. Experiments have been made during the last ten years in Germany, at the government gun-cotton factory at Hainau, which was until recently under the experienced management of a field officer. The disadvantages of gun-cotton for use in war, which have hitherto been marked, were at last successfully removed, and it has been found possible to give it those properties which now place it in the very first rank as an explosive for bursting charges. Damp gun-cotton, when prepared in a particular way, possesses exactly the required properties.

Gun-cotton when in the possession of the troops is stored wet. A primer of dry gun-cotton, with a special fuse, is issued to the troops for the purpose of igniting it; the composition of this fuse is a secret. The fact that the gun-cotton is stored wet insures security against explosion, and against that

*From the Swiss *Journal for Artillery and Engineers* and republished in the *Neue Militärische Blätter* of September and November, 1890.

spontaneous combustion which has with such justice been urged as an objection to its use.

Gun-cotton, however, owes its present immense and assured efficiency not only to the experiments at the Hainau factory, but also to those conducted by v. Forster and Wolff at their factory at Walsrode, in Hanover.

These gentlemen took out two patents in 1883: one for a method of preserving gun-cotton; the other for the construction of a shell filled with gun-cotton. The method of preserving it, discovered by v. Forster, consists in plunging wet or dry gun-cotton for from 15 to 20 seconds into ether; this results in the formation on the surface of a very thin and hard yellow-brown layer which is waterproof, and which gives the gun-cotton the appearance of a piece of wood. Nitro-benzole, or any other of the liquids which dissolve gun-cotton may be used in place of ether. This layer does not deprive the gun-cotton in the smallest degree of its explosive qualities, but it prevents it from losing its consistency and from deteriorating, hinders the breaking up of the mass, maintains it at the required degree of moisture, and does not allow the passage of paraffine through it. As, however, this thin skin must always contain very minute pores, water will find a passage, and the condition of the gun-cotton will change in the course of time. According to Forster, this disadvantage can be guarded against by good conditions of storage. As a matter of fact, gun-cotton which contains 25 per cent of water will, if it has no protective layer and is exposed to a strong current of air, lose its moisture in a few days; whereas, if it be dipped in ether and be exposed to the same current of air, several weeks will be required to reduce it to a dry condition. On the other hand, the layer is so thin that its combustibility presents no element of danger.

In the event of dry gun-cotton being adopted for bursting charges, Forster recommends that the charge be dipped in ether, and that, moreover, the channel left for the fuse should be closed with paper and the charge plunged into a paraffine bath, which makes a second impermeable coating.

These facts led the Walsrode factory to take out a new patent in May, 1885, for another method of filling, and for a special system of securing the explosive.

The gun-cotton is employed in the shape of prismatic grains, made by cutting up compressed gun-cotton discs. To the charge of wet gun-cotton are added 7 oz. of dry gun-cotton. When the charge is in place, a plug is driven into the fuse hole of the shell, in order to keep open the space which is to be occupied by the fuse and the detonator; this plug is pierced with a curved channel, through which paraffine, at a temperature of from 167 to 176 degrees Fahrenheit, is poured. The paraffine fills up all the spaces between the grains, and as it condenses, forms the charge into a compact mass.

The fuse is the German percussion fuse, 1873 pattern. The cup shaped

*Forster objects to the use of gun-cotton dipped in paraffine, such as is produced by the Kruppamuhle factory in Silesia. According to him, the material when so prepared, is protected against neither decomposition nor accidental combustion; its inflammability, he says, equals that of dry gun-cotton, while it would be more sensitive than wet gun-cotton to shock; for example, it would be exploded by three successive hits from a Mauser rifle, whilst gun-cotton containing 15 per cent. of water would not be affected by the same conditions.

part of it is lengthened, and the lower part left open; it holds a cap containing 7.7 grains of detonator, and surrounded with a gutta percha ring and tube. The whole is held in place by a screw. When it is desired to delay the action, a longer cup is used and composition is inserted between the striker and the cap. In order to secure internal contact between the detonator in the cap and the charge, the cap is surrounded with a cartridge of 5.5 drams of dry gun-cotton; this is protected against jolting by a gutta percha ring.

The shells are stored filled; the primer and the fuse are inserted only at the moment of firing. Up to that time a tube, which is intended to hold the primer, protects the interior of the charge.

In the spring of 1885 the German government supplied a 6-inch cast-iron gun for the trial of this method of filling shells. Shell of the 1869 patern were used, having a length of 2.5 calibres, and fitted with a lead jacket; they weighed empty 59.5 lbs., and had a capacity of about 122 cubic inches. Each shell had a bursting charge of 29.7 lbs. of gun-cotton, containing 20 per cent. of water; this was in parallelopiped-shaped grains, .78-inch long, with a side of .4-inch; to this was added 7 oz. of dry gun-cotton in cubical grains of .23-inch side. The shell was fired with a charge of 3.3 lbs., at a parapet at a range of 76.5 yards. The velocity, measured 33 yards in front of the gun, was 804 f. s.

Of the five shell fired not one was premature. Two of them were provided with a delay-action fuse, and these made deeper craters than the three others.

The number of splinters was remarkable, but none of them exceeded a few hundredths of an inch in size. A hail of splinters was thrown more than 75 yards to the rear. One shell was burst after having been buried in peaty soil at a depth of 3.28 feet; the result was a circular crater about 6.5 feet in diameter, and 27.5 inches in depth, with a capacity of 43.8 cubic feet.

V. Forster then hit upon another arrangement with regard to the position of the percussion cap, but he gives no account of it, though it seems to have afforded good results. He continued his experiments, testing in turn every detail of the system which he had brought forward.

To this end he fired blind-filled shell, provided with a fuse having no detonator, and with a bursting charge of wet gun-cotton. After the round had been fired it was found that the detonating composition in the cap had not exploded.

Filled shell were then fired without a fuse or cap. No burst took place, and it was found that the gun-cotton charge neither set back nor underwent any change.

Filled shell, with a fuse, but without a detonator, were then fired with a velocity of 1378 f. s. against a parapet protected with strong timber, or with a covering of wood and wrought-iron bars; they did not burst. The resistance of the target was then gradually increased, but the shells remained whole, until the resistance was sufficient to break up even an empty shell. Under such conditions the bursting charge generally ignited, but was in some cases thrown back undamaged.

Experiments were finally made with shell fully filled and fused. More

than 200 rounds of 3.4-inch shell were fired with a velocity of 1476 f. s. Common shell filled with gun-cotton were fired, with a velocity of 656 f. s., from rifled 6-inch mortars, and with a velocity of 1312 f. s. from the long 6-inch guns. Both these last pieces fired also steel 6-calibre shell, filled on the same system. Not one shell burst in the bore, and the detonation [at the target] was always complete.

In the experiments in bursting shell at rest, 200 splinters were counted which were over 5.6 drams in weight and 600 between .5 and 5.6 drams, when a cast-iron 3.4-inch common shell of 15.4 lbs. was burst. A steel 3.4-inch shell of 14.5 lbs. gave 23 large fragments, weighing in the aggregate 4.9 lbs., and 117 small pieces, of which the total weight was 6.2 lbs. A 6-inch cast-iron shell of 59.5 lbs. produced 376 splinters of more than 5.6 drams, and 828 of from .5 to 5.6 drams. It may be remarked that splinters weighing less than 5.6 drams penetrated beams 9.8-inch thick.

A 6-inch shell, 6 calibres in length, containing a charge of 22 lbs. of gun-cotton, was burst after having been buried vertically in the ground with its base 9.8 inches below the surface; it made a crater 13.1 feet wide, 4.5 feet deep, and with a capacity of 246 cubic feet. A charge of 17.6 lbs. made a crater 11.5 feet wide, 5 feet deep, and with 210 cubic feet capacity. With a charge of 35.2 lbs. the following dimensions were obtained: with 16.7 feet; depth, 5 feet, capacity, 420 cubic feet.

The *Rivista d'Artiglieria e Genio* announced, in November, 1885, that the German Government had adopted the Walsrode granular gun-cotton as a bursting charge for shell.

Since the year 1882 the German artillery have, on their part, been making experiments with gun-cotton shell. The object of the first trial was to discover whether it was possible to throw shell containing a very large bursting charge from the 8.26-inch mortar.

With this object steel in place of cast-iron, was at first used as the material for the shell, in order to reduce the thickness of the walls, and therefore to increase the internal capacity. They also tried to bring the length of the common shell up to five calibres, and to use gun-cotton as a bursting charge.

According to the article, already referred to, in the *Militaire Spectateur*, the "torpedo-shell" for the 8.26-inch mortar were as follows:

The shell was composed of two parts, the base and the head, which were screwed together. The charge, which consisted of small [.19-inch] discs of compressed gun-cotton containing 20 per cent. of water, was procured in casing of zinc or thin lead. The upper discs had a cylindrical cavity in their centre, which contained a cartridge of dry gun-cotton; through this a channel was bored for the mercury cap.*

When the charge was put into its casing, a wooden ring was placed in the channel which had been left for the cap, and paraffine was poured through it in order to fill up the spaces between the discs. The casing was then closed with a metal cover, which had an opening to fit the cap. When the casing had been introduced into the shell, and the head of the latter was placed in position, a hollow screw was put into the fuse-hole of the shell,

* Note by the Translator: This seems obscure, I therefore give the original. "Welche von einem zentralen Kanal für die Zündkapsel aus Quecksilber durchbort ist."

which was intended to hold the casing in its place and, at the last moment, to receive the fuse and the percussion cap.

The use of compressed discs of gun-cotton permits of the packing in the same space of a charge about one-third larger than would be the case were the gun-cotton in grains. On the other hand, this requires that the shell should be made in two pieces, which must be fastened together, and also the provision of special discs for each calibre.

General Brialmont reports that at Cosel, in 1883, practice was carried on with 8.26-inch mortar against old casemates, of good brickwork, 3.28 feet thick, which were covered with a layer of concrete 2.6 feet, and with earth from 3.28 to 5 feet in thickness. Shell 6 calibres in length, having a charge of 42 lbs. of gun-cotton, pierced the casemate and burst inside. It was found, General Brialmont further remarked, that the 8.26-inch shell, filled with 57.3 lbs. of gun-cotton, when they were fitted with a delay fuse, penetrated 13 feet into the sandy soil of the Kummersdorf ranges, and followed the usual drift of an ogival projectile, which resulted in their being found in an almost horizontal position at the end of their course. A casemate 3.28 feet thick, and covered with 10 feet of sand, was pierced by similar shell, which were not stopped until the covering was 16.4 feet in thickness. A crater in the sandy soil of the range was 15.75 feet in diameter, and 7.87 feet in depth, which gives a capacity of about 526 cubic feet.

Experiments with gun-cotton shell have been carried out with a certain number of other pieces of artillery, particularly with the 6-inch and 11-inch mortars. The bursting charge used for the 11-inch shell was 110 lbs.

The question as to what influence the adoption of the shell filled with high explosives will exercise on the construction of fortifications is a double one. It embraces a technical side, the construction of bomb-proof cover in the first place; and in the second tactical side, the general arrangement of defensive works.

How should horizontal cover be now constructed so as to afford protection against vertical fire with heavy [8.26-inch and 11-inch] gun-cotton shell? This is a question to which the answer can only be found on the practice-ground. In this respect Germany set an example, in the experiments of 1885 and 1886 at Kummersdorf, which must be followed by other nations.

To thicken the covering of earth is the simplest, and probably the cheapest method of increasing the power of resistance of horizontal cover. Taking into account the penetration of heavy gun-cotton shell, Brialmont is of opinion that it will be sufficient to increase the thickness of the covering mass to 16.5 feet, using sand alone and retaining the existing casemates. This estimate of 16.5 feet is founded on the fact that shell with delay action fuses, after having penetrated from 13 to 16 feet, follow a curve greater or less than that at which they enter the earth, and remain sufficiently far from the casemate for it to suffer no damage from the effects of the burst. The force of the explosion will be taken up by the solid mass earth which still remains between the shell and the casemate, and will only be transferred to the latter in a weakened form.

However just this deduction may be, there still remain serious objections to such a thickening of the earth cover. In the first place, it is

evident that this method cannot be successfully employed in the majority of cases of, at any rate, forts of the present construction, owing to want of lateral space in the case of bomb-proof buildings on the rampart, and the vertical space in the case of such [posterns, caponiers, etc.] as are under the ramparts. The construction of existing buildings will, moreover, in many cases not permit of the necessary increase of load. Again, the further question arises, how are the equally important retaining walls and buttresses to be protected by their earth cover against the lateral action of a shell which burst at their back?

Apart, however, from the above consideration, the question must be asked whether the thickening of the earth cover is the most desirable means to be used to this end. If we grant that a thickness of earth of 16 feet above the crown of the casemate is ample under all circumstances to secure the casemate against the effect of the burst of a single shell (of which many are by no means convinced), how long will such security be afforded by earth cover, in which craters of 526 cubic feet capacity have been made? The first shell which falls into a freshly made crater must pierce the casemate.

Moreover, against even single hits of the 11-inch gun-cotton shell, 16-4 feet of earth will be insufficient.

According to the opinion of the Dutch author, an increase of the thickness of earth as a means of strengthening bomb-proof cover should therefore be taken into consideration only in peculiar cases, unless the fact that the available vertical space is not narrowly limited permits an opportunity of forming an earth cover of exceptional thickness. It is impossible, moreover, to deny the disadvantage which will accrue from the fact that this towering and very conspicuous mound of earth will, from a tactical point of view, serve as a target.

To thicken the casemate itself while retaining the existing thickness of earth over it, appears to have little to recommend it. Cover strengthened in this way, was not efficient at Kummersdorf, and this failure is easily explained. The earth cover, in its present condition, will not be able to prevent shell from penetrating *to*, and probably *into*, the casemate. Again the fact that the shell will be almost entirely enclosed in the earth cover at the moment of burst will be sufficient to increase the effect of that burst to an enormous extent. It is certain (from what we can discover from the calculations, according to the accepted formulæ, for mine charges, when used for the destruction of masonry under similar circumstances) that even casemates 6 feet in thickness, and covered with earth, would be completely pierced by the 8.26-inch shell. Moreover, even if the casemate be made strong enough to resist the burst, each shell which falls on the earth cover will make a colossal crater, thereby forming a vulnerable spot, on which any succeeding hit must be fatal.

In this last remark lies a hint as to the direction in which the answer to the question, how to obtain security against vertical fire, may perhaps be found. We must endeavor:

1. To limit the effect produced on the cover by each individual shell, to thus resist its penetration, and to cause the burst to take place under the

most unfavorable conditions, that is to say, when it has as little penetration and is as little enclosed as possible.

2. To take care that as few points as possible favorable to attack are vulnerable to subsequent hits, to be created by the burst. *The effect of the burst must, therefore, be localized.*

Cover of the construction now used, where a horizontal layer of hard concrete is introduced into the earth cover (say at half its height), will as little fulfill the foregoing requirement as does the cover which Schumann has proposed. He makes use of his well-known casemate of ogival section, formed of curved I-iron and arched partition walls, and adds a horizontal concrete layer, 3.28 feet in thickness, as a protection against high explosive shell. He regulates the thickness of the concrete on the principle that the shell which first hits, even at their maximum of penetration, shall remain so far from the wall of the casemate that it will be secure from the effect of the burst, and that a shell which falls on the layer of concrete must also burst there, and will thus by its own action, fail to reach near enough to the casemate to have any effect upon it. All this is very true, but it must not be forgotten that the first shell is as likely as the last to open a wide lane in the concrete, and an immense crater in the layer of earth above it. This cover will undoubtedly be able to resist isolated hits; but their effect would not be sufficiently localized, and a subsequent hit, if it fell on such a vulnerable spot would undeniably reach and destroy the casemate.

It therefore appears necessary, in order to meet the conditions stated above, that the cover which is used above [the casemate] shall consist of some hard and strong material. If this be granted, the use of earth for the upper stratum of bomb-proof cover becomes at once out of the question. Three kinds of construction may, in the opinion of the author, be considered as worthy of trial and comparison, with respect both to their power of resistance and to their cost.

I. Massive cover, composed of concrete, having a hard layer on the upper side.

II. Light constructions of iron or concrete, covered with earth and enclosed in a case of concrete, which is hardened on the upper side.

III. Metal armor.

It appears from the Austrian experiments, which were carried out in 1875 with the 8.26-inch mortar, that the penetration into masonry of the 192 lb. common shell, when filled with powder, may amount to from 2.75 to 3 feet. We may be certain that heavy gun-cotton shell will penetrate considerably deeper. We may deduce, however, from the Kummersdorf trials, that a horizontal layer of good concrete, 9.8 feet thick, without any earth over it, will be capable of resisting individual hits from heavy shells filled with gun-cotton. But the effect of these shells will not in each case be sufficiently localized if ordinary concrete be used, and therefore a danger from subsequent hits will exist. It is possible that complete localization might be arrived at by using concrete of extraordinary hardness and strength, *e. g.*, the French cement concrete, which is used at Bucharest; but if this is not the case, then a hard covering must be placed over the concrete in order to resist the penetration of the shell.

Even if this covering does not remain entire, the shell will in any case only partially penetrate, and the effect of the burst will be considerably less extensive than it would be in a soft material.

Various materials may be thought of for the hard covering mentioned above. The harder and the stronger they are, the better will they answer their purpose, but, of course, the expense of supply will play an important part in their selection.

Columnar basalt is a cheap material but it must be set with its axis vertical. It possesses great hardness, but is found only in pillars of very small, and more or less irregular, section, so that many and very wide joints are unavoidable; these would offer numerous points for attack, through which the burst might make its way. Granite is likewise hard, but is very friable, though considerably more durable than basalt. It has the further advantage that it can be worked in very large blocks, and is in this form peculiarly suitable for revetting along the edges of the corners of the hard layers. It will probably be necessary to tie the blocks used for this purpose very firmly to the layer of concrete.

We have now to consider a third material, which exceeds all others in hardness, strength and power of resistance: iron, and that in three forms; wrought-iron plates, and cast-iron blocks, chilled and unchilled. These are here quoted in inverse order to their cost, but they are all considerably more durable than the hard natural stones, or the cement concrete already mentioned. On account of their cost, they could only be thought of for specially important objects, as in cases where the vertical space available will not allow of greater thickness being given to the concrete layer, and where this deficiency must, therefore, be made good by the greater power of resistance of the covering layer.

Wrought-iron plates offer great advantages in construction, viz.: few and well closed joints; undiminished quality with small thickness (plates of from 2 to 2.75 inches may perhaps be found sufficient); and the absence of any necessity for a special material to revet the edges.

Chilled cast-iron is very hard; would therefore allow the least penetration, and would probably suffer the least injury from the burst. But it is brittle, and must, therefore, be made of considerable thickness, so that it becomes both very heavy and very expensive. In order to avoid unnecessary expense it must, of course, be made in our own country.

Cast-iron is the cheapest of all materials for armor. It is also extraordinarily tough, and is yet sufficiently hard to resist the penetration of ordinary shell. The advantage of its low price is, however, gained principally in the case of small blocks, while these involve disadvantages in construction. It may perhaps be used to the greatest profit in the form of very thick plates, or in that of small columns set vertically, and revetted along the outer side of the layer with larger blocks well tied down. Each material has thus its peculiar bad and good side. Practical research and subsequent calculation of the cost can alone settle the question as to the character and the requisite dimensions of the best system.

It is desirable to use a support of I-section joists, with curved iron plates between them, in the interior of the bomb-proof cover. This is intended

less as a means of directly increasing its power of resistance to the effect of the impact and the bursts of the shell than to prevent the breaking away of the concrete in the interior; it is especially useful in supporting the sections into which the bomb-proof cover may split under the influence of repeated hits.

From what has already been said, it is sufficiently evident that in the construction of bomb-proof buildings attention must be paid not only to the horizontal cover proper, but also to the revetting walls and buttresses, as well as to the counterforts and to the front and rear end walls. In the case of the construction now under consideration, no mention need be made of revetting walls. Buttresses must also be changed as little as possible; but they must be made very strong if they are to offer an effective resistance to gun-cotton shell which strike behind them.

Counterforts and rear walls must, of course, at all times be protected by earth against the enemy's direct fire, and consequently the gun-cotton shell which first strikes these walls will be completely buried on all sides. This unfavorable factor is counterbalanced by the circumstance that this masonry is either not at all, or only in a small degree, exposed to the impact and penetration of projectiles falling at high angles, and will, therefore, only need to hold its own against the effect of their burst, while at the same time it may be taken for granted that the chance of successive hits falling on the same spot is less than would be the case with horizontal cover.

Two forms of construction offer themselves for trial and comparison, both from a technical and financial point of view:

1. Thick ashlar walls.

2. Thin walls, surrounded with a layer of concrete, and with a course of earth between them.

As far as can be ascertained by calculation, ashlar walls would have to be at least 8.2 feet thick in order to resist effectively the burst of a heavy gun-cotton shell when completely buried [in earth]; it may then be assumed that they would be able to withstand several successive hits. A cheaper construction appears to be that in which a very thin concrete envelope prevents the shell from approaching so near to the inner wall that the latter will be affected by its burst; the action of the burst will be taken up both by the envelope and by the courses of earth pressed together behind it. It is, however, evident that in this case large gaps will be made in the envelope, so that this system of construction obviously affords less protection than do the ashlar walls. One final point demands the greatest attention, that is to say, the front side of the building. We shall have been reminded by what has been already said that a shell falling very obliquely to the target and at a high angle of descent, if it should strike just at the foot of the front end wall and undermine the foundations, would not only endanger that wall, but would, moreover, tend to block up the entrance to the building by the masses of earth and stone thrown up by its burst. It was found during the Kummersdorf experiments that from three to four hours' work was necessary in order to clear away such masses, and to make the building again accessible. The difficulties which might constantly arise from this cause during a siege are obvious. General von Sauer also points out the

danger which threatens the entrances. It is therefore recommended that a thick and wide screen, in the shape of a concrete cover, 9.8 feet wide and 6.5 feet thick, be erected along the front side of the building. Such craters as will be made in this by shell will be considerably smaller than craters in earth, while in any case the undermining and the fall of the front wall will be prevented by its use.

The idea of keeping the burst of a shell, by means of a concrete envelope, at a considerable distance from that part of the building which especially requires protection can usually be carried into effect, and horizontal cover can generally be adapted to the purpose. The building itself may then be of slighter construction; the envelope will stand quite independently, and will carry its horizontal roof on its own side walls. For the internal construction can be used either light buildings of concrete and masonry or Schumann's well-known ogival-arched casemate, of which the curved partition walls can easily be formed by the use of curved iron plates. Flat iron frames may also be used for this purpose, such as those which Schumann proposed to employ as the support for the masonry substructure of his armored mounting for light guns.

The concrete envelope must be provided with a hard protective layer on the upper surface if the cover is to come under heading I.* With reference to the method of tying them together, what has already been said holds good, as it does also with respect to the screen along the front side of the building, etc.

We may next consider heading 3, metal armor. There can be no doubt that armor offers a most excellent means of obtaining protection from heavy gun-cotton shell. It appeared at the German experiments that the 8.26-inch gun-cotton shell could pierce a wrought-iron plate 6.2 inches thick; but the shell was there burst in contact with the plate. This experiment gives, therefore, no accurate representation of the effect of a shell which has been fired at a high or low angle of elevation, and is valuable only as a proof of the enormous destructive power which is inherent in the shell.

[Note by the translator.—The two words here used are: *werfen*, which expresses fire with a low velocity and at a high angle; and *schiessen*, implying high velocity fire at a low angle of elevation.]

If these shell were thrown at high angles against armor, we may be sure that the effect would be very slight, and this for the following reasons (which also apply to the hard surface layer over the concrete cover, which has been already mentioned, as well as to such as are made of iron):

1. The penetrative power of the 8.26-inch gun-cotton shell must be extremely small, indeed almost *nil*. The energy of this projectile is also small in comparison with that of ordinary armor-piercing shell, and with such as is required in order to produce a due effect upon armor. Above all, its final velocity is very small, and this fact of itself bars the possibility of any considerable penetration. Moreover, gun-cotton shell are not armor-piercing shell, and are therefore not suited to offer resistance to the reaction of the armor; they are, on the contrary, only common shell of particularly

* Massive cover composed of concrete, etc.

weak construction, due to their great length, their thin walls, and the method of forming the head by compression. There is, therefore, a great chance that they will burst before they have fully developed the whole of their energy.

2. In consequence of this deficiency in penetrative power, the effect of the bursting charge fails to find favorable points of attack, since when the charge acts it is confined by the shell only, and is thus unfavorably situated. If the shell breaks up before the explosion, it is very doubtful whether a complete detonation of the bursting charge will take place, and the chances are large that a portion of the gun-cotton will be merely ignited and thrown out unaltered.

3. It is simply impossible to conceive a case where a shell which has fallen upon armor, and has not been able to pierce it, will remain lying upon it. The shell will either burst or will rebound from the armor. We have already discussed the first of these cases. However deep the original indent may be, the result of the rebound will undoubtedly be to increase the interval between the shell and the armor before the explosion takes place, while we have seen above that the existence of such a space tends to materially diminish the effect of a high explosive.

Many reasons therefore exist which justify the opinion that high angle fire with gun-cotton shell will have but a very small effect on armor. The Kummersdorf trials entirely confirmed this opinion. It is very well known that Schumann's first armored mounting which was in 1882 tried at Kummersdorf under the high angle fire of common shell was again tried in 1885 with gun-cotton shell and was completely able to hold its own against them. This armor was by no means particularly heavy, nor was it constructed in a manner specially advantageous for resistance; it was not composed of one solid plate but of thin (1.5-inch and 1.9-inch) plates laid one on the other and was in the shape of the segment of a sphere having a thickness in the centre of only 3.9 inches and at the circumference of 7 inches.

Various other armored constructions which were tried at Kummersdorf also held their own against gun-cotton shell, so far at least as the power of resistance of the armor went. In his last work. *La Fortification du Temps Present*, Brialmont refers to the small effect produced by these shell against armor, and v. Sauer confirms the correctness of this opinion. It has been observed that v. Forster expresses the opposite opinion in his pamphlet, *Compressed Gun-cotton, Etc.*, but his remarks and anticipations should have less weight than the facts brought out by experimental practice. Moreover, it cannot be denied that it is possible that some fortunate hits may produce an effect even upon armor, especially when a very large bursting charge is used; for example, the 11-inch shell, holding 100 to 110 lbs. of gun-cotton. But in any case the effect against iron *must* be much less than on any other material; where destruction is inevitable, that is the best material which is the least and most slowly destroyed.

A discussion concerning the details of construction of armored cover would carry us too far. Let us, however, once more recall to memory the words of General von Sauer: "A shell of this kind sometimes falls beside (and not on) the shield which it is intended to destroy." It is no use to

provide the bomb-proof space, which we wish to render secure, with armored cover capable of great resistance unless this armored cover rests on indestructible foundations. Moreover, since the iron and masonry which serves this purpose is now-a-days, as a rule, either entirely or in a great part covered with earth, we must take into consideration the fact that the gun-cotton shell which will act against them will gain in effect by being entirely buried. The arrangements mentioned above as necessary along the front ends, and for the protection of the entrances of such armored spaces, will also be required in order to fully meet the case.

Armored cupolas, if sufficiently strongly protected will, of course, always give security against shell to the emplacements and spaces below them. It is therefore advisable to use these spaces as much as possible for the storage of ammunition; for example, by providing numerous and spacious niches in the masonry substructure. Again, Schumann draws attention to the danger to these masonry substructures from high explosive shell of large capacity (*Torpedogranaten*). It will, on this account, be necessary to protect the masonry with a thick and wide ring of concrete along the outer side of the chilled-iron glacis.

LETTERS ON ARTILLERY.

By PRINCE KRAFT ZU HOHENLOHE INGELFINGEN.

Translated by Major W. L. Haskin, U. S. A.

XVII.

REPLY OF THE CORRESPONDENT GIVING A SUMMARY OF THE PRECEDING LETTERS.

I HAVE for three months delayed answering your last letter of the month of September. I have been reading your sixteen letters many times over, and have been meditating upon their contents.

You proceed by bounds, going sometimes here, sometimes there, like the hunter who pursues his game wherever he gets sight of it. Therefore I have taken the pains to make extracts,—to recapitulate,—to arrange under proper headings,—what you have written, and you will greatly oblige me if you will say in your reply whether you approve the synopsis which I have made.

I. WHAT DO WE ACTUALLY REQUIRE OF THE ARTILLERY?

1st. What we require of it in the first place can be summed up in very few words. The artillery should first strike the enemy, then *strike the enemy*, and again STRIKE THE ENEMY. Under this heading is included all that concerns the accurate service of the pieces, the most exact observation of results, and the most rational method of obtaining the range and regulating the firing.

2d. The artillery should in future be able *to appear upon the field at the*

exact moment when its services are required. To effect this it is necessary to exercise it in traversing distances of many miles at rapid gaits, and even to make forced marches of a day's length.

From the moment when the artillery is capable of fulfilling these two requirements, it can do all that is necessary or that can be required of it in its employment in the field.

II. THE ACTION OF THE ARTILLERY IN BATTLE IS DEFINED BY THE FOLLOWING RULES:

1st.—General Rules.

A. The action of the artillery will be efficacious only while it never forgets that it is but an auxiliary to the other arms.

B. It must avoid all useless cannonading, and in consequence will endeavor *always to approach the enemy as closely as possible.*

C. Yet, in view of the improvements made in modern arms, it will ordinarily be necessary to begin the artillery duel beyond shrapnel range, that is to say, at a distance greater than 3500 metres.

D. But the *decisive artillery duel* will take place at a range of 2000 or 2500 metres.

E. Artillery should always fire upon troops of the other arms as soon as they appear within its effective range. But as these troops will protect themselves as much as possible by the use of all available natural covers;—as they will disappear very quickly behind them if by accident they have appeared in the open;—it is its combat with the enemy's artillery which will occupy the arm during the greater part of the time.

F. *Artillery should never open fire with precipitation.* The regulation intervals should be strictly observed to the end that *the captain shall be the absolute master in the matter of directing the fire.*

He must avoid all artificial methods of procedure, such as salvos (except when used for obtaining the range),—or obtaining the range from some point in rear of the position which he will occupy in action,—or the "diagonal" fire,—etc., etc.

G. Artillery should go into action, ordinarily, with all the batteries of the battalion. It is only exceptionally the case that an isolated battery will open fire. Nevertheless the battalion should not be taken into action by a single command or trumpet signal. Each of the batteries should receive a special order, or else the battalion commander should give his instructions to each of his captains.

H. *The artillery should never be without ammunition.* That it should have a supply of ammunition at the opportune moment is for it a vital necessity. This is why it should endeavor to *keep the limber chests of the pieces always full.* The ammunition contained in these chests will form its *last reserve.* If, in spite of all endeavors, ammunition fails, artillery must nevertheless remain in position without firing, until a new supply can be obtained, and so long as no order to retire is received.

2d.—In the Offensive.

A. When the batteries shall have silenced or driven away the enemy's

artillery it will not, as a general rule, advance nearer than 1500 or 1600 metres to the enemy's infantry, yet intact, which is not occupied in the conflict with other troops.

B. If the enemy's infantry is held in check by another fraction of the artillery, or by infantry, the artillery can approach to a distance of 1000 or 1100 metres, and whenever this is possible it *must* do it.

C. In the heat of the *decisive combat* the artillery should not hesitate *to move up as closely to the enemy as it is possible for it to get.*

D. As soon as the general attack has proved successful the artillery must move to the front to assure by its fire the possession of the captured position. At this moment, it will post itself, in the greater number of cases, on the line of skirmishers.

3d.—Upon the Defensive.

A. The normal position of the artillery in defensive positions (the nature of the terrain very often will modify this) shall be 500 metres behind the most advanced infantry position, that is, if the infantry leaves the field of fire open for the artillery.

B. It will *never abandon* its position. It will not withdraw even if the enemy advances to the muzzles of its pieces, *unless the general in command gives the order for a general retreat.* This must not be understood as preventing the batteries which are on the defensive, in the case in which the assailant has the advantage in the artillery duel, from ceasing fire for the time and running the pieces back under cover in order to reappear unexpectedly at the critical moment.

C. If the order for retreat is given, the only moment when it can be executed is when the enemy has not yet attacked, or when he is preparing to attack again after having been once repulsed.

4th.—Horse Artillery in a Cavalry Combat.

A. As a general rule it will seek to place itself quickly at the distance at which it can engage in the decisive artillery duel. Artillery which is opposed to infantry is obliged to commence the action at great distances. Opposed to cavalry, which moves about so rapidly, this is not the case. Once in position, the horse artillery will silence the enemy's batteries, and at once, or as soon thereafter as the enemy's cavalry shows itself, will direct its fire upon it.

B. While the cavalry division to which it is attached executes a charge, the horse artillery will fire upon the enemy's cavalry, if there be no opposing artillery. If there be no object upon which it can direct its fire *it will remain in position with pieces charged* with shell (not shrapnel). It will in this way be able, if the attack of the division fails, to offer it a point of support and to indicate by its fire the place where it should rally.

C. Horse artillery has no need of any particular escort except upon that wing of its position farthest from the cavalry combat, and there it will need it only to observe the terrain. It will suffice then to give it a platoon.

D. If the charge executed by the division is crowned with success, the

artillery will move quickly upon the theatre of action to assure possession of it by its fire and to coöperate in the pursuit.

III. ORGANIZATION.

It is desirable that the artillery should be organized in the following manner:

Each army corps should have three regiments of artillery;—two regiments of mounted artillery having each two battalions of three batteries each; and a regiment of horse artillery containing three battalions of three batteries each. If, in organizing the arm in this manner, we would still be inferior to the neighboring states in regard to the number of our field pieces, it will be necessary to give each mounted battalion four batteries instead of three.

At the time of the mobilization a regiment of mounted artillery will be assigned to each infantry division and a full and complete battalion of horse artillery to each division of cavalry. What remains of the regiment of horse artillery will form the Corps artillery.

IV. UPON THE EMPLOYMENT OF THE ARTILLERY BY ARMY COMMANDERS.

1st. The (ESSENTIAL PRINCIPLE) is that all serious artillery duels (skirmishes, prolonged cannonadings, etc., excepted) should be *commenced with a number of pieces superior to that of the enemy.* The excess should be employed in extending beyond one of the wings of the enemy's position to take it in flank. Accuracy of fire has increased since 1870 and there is therefore still less reason to constitute a reserve of artillery than there was even at that period.

2d. In conformity with the principles set forth above the (ARTILLERY WILL BE ASSIGNED) as follows:

A. The advanced guard of an army corps, of the strength of one infantry brigade, will receive one mounted battalion; the other battalion will remain with the second brigade.

B. The full division of infantry shall have a regiment of mounted artillery.

C. As a rule the Corps artillery will go into action as one complete and compact mass.

D. The advanced guard of an infantry division, of the strength of one regiment, shall receive one battery.

E. Ordinarily all the artillery of a cavalry division will remain with the main body of the division. Artillery will be attached to its advanced guard only in the exceptional case in which the advanced brigade is expected not only to reconnoitre but also to fight. In this case it will be necessary, above all if the question is of forcing defiles occupied by the enemy, to send the entire battalion for the occasion with the advanced guard. If the cavalry division assists in battle it should send its horse artillery to join the line of engaged artillery in order to assure the superiority in the number.

F. Rear guards receive artillery as advanced guards do. The same principles will be observed in assigning it to them. But if it be the duty

of the rear guard to delay the enemy, a long time it will be necessary to attach to it a much more considerable body of artillery. At times it may be necessary to attach to it even the whole of the Corps artillery.

G. For detached troops, according as they are of greater or less strength, the same principles will be observed as for advanced guards.

H. The separation of batteries into two parts must be avoided as much as possible. Isolated platoons should be employed only in the exceptional cases of combats in streets; expeditions against populations which are threatening to take up arms, etc. An isolated piece counts for nothing,—is equivalent to zero.

3d. *What place shall be assigned to the Artillery in the order of march.*

This is a question intimately connected with that of the special organization of the arm.

The artillery assigned to the advanced guard of a division, or of an army corps, will march either behind the first battalion, or behind the first regiment in the main body of the advanced guard; the artillery of the division behind the first regiment or at least behind the first brigade; the artillery of the corps behind the first brigade or at least behind the first division. The horse artillery attached to the division of cavalry will march behind the first regiment of the main body of the division.

For marches in retreat the same general rules will be observed except that in following them it will be understood that the various organizations have counter-marched.

V. CONCERNING THE TACTICS.

The views which you formulate concerning the tactics can be condensed into a single word. They should be *simple*.

For this reason those evolutions of mounted or horse batteries not necessary to enable the artillery to attain its object in war, should be taken out of the tactics. Thus the artillery will find time to exercise itself with the most minute and scrupulous exactness in all the remaining prescribed evolutions.

SEEN AND APPROVED,

DRESDEN, DECEMBER, 1884.

TWO BRIGADES.

From the German, of CAPTAIN FRITZ HOENIG.

BY CAPTAIN PAUL ROEMER, U. S. A.

(*By permission of the publisher, F. Luckhardt, Berlin.*)

(Continued from No. 52.)

III.

TACTICAL REFLECTIONS.

A TASK like the one at Mars-la-Tour will rarely devolve upon a brigade of 5½ battalions. Still more rare are the examples which this occasion offers, for reflection upon the judiciousness of some of the tactical formations employed in the attack. Another war has been fought since, breech-loaders have again acted against breech-loaders, but it has not produced an equally instructive example.

We still remember the words addressed by Colonel v. Cranach to the assembled officers at the time of the mobilization of the army in 1870. He said: "The French will not attack, but will receive us in long lines. They will allow us to rush forward before they begin their advance. They have changed their offensive tactics and lay the greatest stress upon fire tactics. The superiority of their infantry fire-arms impels them to do this. Therefore practice rapid and energetic advances diligently in order by this means to equalize somewhat the inferiority of our fire-arms." This reference was more significant than any one, the speaker included, at that time anticipated. Later we were to find out its correctness.

Some time before the War of 1870–71 many in the German army were of the opinion that our then company column tactics could not be applied against the fire of Chassepots. While seeking new formations, the declaration of war came, and our infantry went into the field with the consciousness of the inferiority of their fire-arms and insufficient tactical formations. We were convinced that we would receive effective infantry fire at great distances and that we must be prepared to meet with considerable losses, while advancing, without being able to reply.

However tactics may change, one thing is certain, a decision cannot be brought about through fire tactics only. This must be forced by pressing forward with hurrahs and beating drums. The assailant who wishes to dislodge the defender and take his position must press forward. The last moments of decision will be a close combat which we must not understand as a hand to hand fight. The "how" of the advance and the "how" of the close combat has changed, the essence remains.

The French were the first who practised infantry firing at great distances systematically and they applied it for the first time in the War of 1870–71. Now the battle-field of August 16, 1870, was not chosen by them before-

hand. They were forced to fight against their will on a battle-field the character of which was accidentally well adapted to the effective use of their fire-arms. The French generals deserve all praise for perceiving the advantages which the position of height 846-Greyère Fe offered for a fire combat at long distances. From the attack of the 38th Brigade we may determine whether such a widely extended and deadly zone of fire can be crossed, and if it can, how it must be crossed to avoid becoming *hors de combat*.

The questions to be considered are: 1. Was it mass-fire which the brigade received, first from the deployed lines of Division Grenier, and later from the Division Cissey?

2. If we take the number of active fire-arms into consideration was a heavier and more rapid fire possible?

3. In view of the conditions at Mars-la-Tour, can we accept such an increase as possible?

4. Can the French fire at Mars-la-Tour be looked upon as mass-fire at great distances?

5. Was the assailant effectually covered at long distances?

6. Was and is mass-fire at still greater distances possible?

To 1 we answer yes, 2 and 3, no, 4 and 5, yes, to 6, no.

In order to illustrate fully the terrible effect of mass-fire at great distances we must take an example where the assailant attacked under the most unfavorable conditions. We have shown that the employment of the brigade was not suited to the circumstances, but the attack forms an exceptionally good and instructive example in modern tactics. If we can deduce correct conclusions therefrom, upon which depends the importance of this episode, the misfortune of the brigade will not have been too dearly paid for.

When the 38th Brigade at 4 P. M. advanced to the attack, the whole front from height 846 to Greyère Fe (2500 metres) was occupied by troops of all arms. Division Grenier, in two deployed lines, one behind the other, occupied the mound and height 846. Heavy swarms of skirmishers covered the mound while the height (846) contained the remainder of the infantry and the division artillery.

We received an incessant artillery fire, and upon reaching the highway Vionville-Mars-la-Tour, infantry fire as well. Here we lost several men. As far as the mound battalions I, II, and F/16 and I/57 found some cover in the meadow land—the heavy fire continued.

The space of 2500 metres was entirely occupied by two divisions, one fully deployed the other only one-half. Between them were posted at least 6 batteries and several mitrailleuse batteries. If we leave the cavalry division Legrand out of account, we see that, in a space of 2500 metres, 26,000 men were posted in a remarkably strong defensive position—more than 10 men per metre. It is hardly possible that a greater number of fire-arms could have been employed in such a space and therefore a heavier and more rapid fire than that at Mars-la-Tour cannot be accepted as possible.

From the time we crossed the highway Vionville-Mars-la-Tour the mass-fire was uninterrupted. The distance from here to the mound is 1500

metres, and to height 846,2500 metres, consequently this was mass-fire at great distances.

The assailant was effectively covered by this fire at from 1500 to 2000 metres.

At greater distances a mass-fire is without effect even with our present improved fire-arms. To this we may add 1: The whole field was open and within reach of the enemy's fire; and excepting the meadow land north of Mars-la-Tour, was as if chosen for effective mass-fire at great distances. 2: The 38th Brigade passed over a space of 2300-2500 metres covered by this fire.

From all this it will be seen that we attacked with inferior fire-arms and numbers an enemy six-fold our superior in the latter regard. We cannot think of a more difficult battle-field and a more complicated state of affairs. We thought to outflank the enemy, but were ourselves outflanked and repulsed by turns from right to left.

Applied tactical formations: As far as we could learn these were as follows. At 2500 metres:

II/16 company column (7, 5) behind half battalion (8, 6).

I/16 company column (3, 2) behind half battalion (4, 1).

F/16 company column (11, 10) behind half battalion (12, 9).

1/57. Deployment of two whole companies (1, 2) as skirmishers; behind them 4.3/57 as half battalion up to 1500 metres, then in company column.

F/57. Column on the centre. At 100 metres south of the highway the formation changed into column of half battalions, 11.9 and 12.10.

The 2d and 3d company pioneers formed in company column up to 1500 metres.

The advance in one front: The regiments form alongside of each other. When halted before the enemy's position,* 8/16, 6/16, 4/16, 1/16, 12 & 9/16. 11 & 9/57, 12 & 10/57 advance into the first line.

One-half of the companies had züge deployed as skirmishers, 12 & 9/16, 4/57, 3/57, 11 & 9/57, 12 & 10/57, 2 & 3/P. remained closed during the whole action.

The advance to the attack was quickly made, 1000 metres being passed over in 12 minutes. We must allow 30 minutes for removing obstacles (wire fences) and the advance of the centre, 30 minutes for the action, and 30 minutes for the retreat—total 1¼ hours.

It is difficult to give a correct account of the amount of ammunition expended. Exact records could not be obtained from the reports of the troops, but the general opinion is that we were put out of the fight before we could use our fire-arms with effect.

The five battalions went into the battle with 95 officers and 4546 men. Before arriving at the enemy's position they lost perhaps 25 per cent., which reduced their number to 3410. 12, 9/16 and 4, 3/57 did not fire a shot. If we estimate their number at 909, and add to this the loss of 25 per cent., there remained only about 2828 effective fire-arms when the brigade arrived before the enemy's position. Officers of F/57 state that their men fired from 3 to 5 rounds. Taking the average of these at 4 and of the other com-

*See sketch III.

panies at 10 gives a total of 24,188 shots fired. From this must be deducted a certain number due to losses during the action. These losses amounted to nearly 53 per cent. of the numbers engaged, but the greater portion of losses occurred in the retreat. It is therefore very difficult to determine the exact amount of ammunition expended, though this probably amounted to about 20,000 rounds.

We could not find out the amount of ammunition used by the enemy. This must have been unusually large for General Ladmirault (IV. Corps), reported in the evening of August 16, that he was short of ammunition. On the morning of August 17, a large number of cartridges were found on the enemy's lines marking the extensive position occupied by him. Some men of Division Grenier reported that they fired 150 rounds per man. Their rifles were so hot that they could hardly hold them.

Let us accept 80 rounds per man as the number fired by the enemy. With 20,000 combatants, this gives 1,600,000 shots or one hit to 763 shots fired. Some were hit several times. Killed and wounded with four to five wounds were not infrequent. A more forcible example against firing at great distances can hardly be found.

The five battalions of the 38th Brigade went into action with 95 officers and 4546 men. They lost in killed and wounded 71 officers and 2024 men, that is 74 per cent. of officers and 42 per cent of men. The loss during the advance of 1500 metres was about 35 officers and 1012 men.

In spite of extended attack formations under most unfavorable conditions the brigade arrived close enough to the enemy's position to bring him under the effective range of infantry fire-arms. An advance in company column with skirmishers without halting proved sufficient against mass-fire at great distances.

The brigade did not suffer defeat so much on account of its applied tactical formations as from faulty leading, great numerical superiority of the enemy and misapprehension of the situation. The battle-field was most unfavorable for an attack, still the German losses up to the retreat were not greater than in any other modern battle. They were even less than in some of Frederick's and Napoleon's contests in which the enemy's position was taken by storm. The circumstances may therefore be looked upon as normal. Did not the enemy suffer as much at Beaune la Rolande, Bapaume and on the Lisaine?

The picture of the attack as well as the manner in which we have attempted to describe its details must deter us from falling into extremes. The importance of mass-fire at great distances lies more in its moral than its material effect, and we must seek tactical formations which will reduce this moral effect as much as possible.

All we have seen, heard and read of the Austrian-Saxon troops must fill friends and foes with respect for their discipline and good behavior on the battle-field. Within range of destructive infantry fire they preserved order, bearing and tactical formations.

Our experiences on the battle-field of Mars-la-Tour were different. We acknowledge that, at the beginning of the war, we had a high opinion of the moral and physical qualities of our enemy. There were many at that

time who endeavored to prove that the Imperial French infantry was tactically superior to that of the German. No doubt, in the first period of the war, the Germans committed many tactical errors.

Let us examine the French manner of attacking.

After the 38th Brigade had been repulsed, at first one division followed in pursuit, then a half-division was added. Intact infantry no longer opposed them, still their advance was incredibly clumsy and slow. First came a line of skirmishers in the greatest disorder, with absolutely no tactical formation, everybody shouting. The whole command halted repeatedly, although there was none to oppose them. A second line of skirmishers followed, then battalions in line with their eagles.

The artillery did not follow up the movement, with the exception of one battery which advanced as far as the ravine and opened fire on Tronville.

The first line of skirmishers fired, as a rule, from the hip without taking aim. When the French battalions arrived at the place where the greatest number of our dead and wounded lay, about 150–300 metres south of the ravine, they halted. The intervals between battalions were very irregular. The first and second lines of skirmishers were partially mixed up. They had advanced to within about 150 metres of the mound when our first Guard-dragoons charged and produced an indescribable disorder. The French rushed back throwing away their arms and equipments. Some skirmishers lay down between the dead and wounded, others formed little groups. There was firing from all sides, including an irregular fire from the closed battalions.

That three troops of Guard-dragoons could charge through three lines, two of which were put to flight, and the third, closed battalions, thrown into disorder and demoralized, seems hardly credible. Here is a lesson.

Much has been written about this brilliant action, but no author has ever attempted to explain why it succeeded. The explanation is simple. If the French infantry had possessed what all regular troops should possess—tactical order and discipline—no cavalry in the world could have gained the least success on an open field where every chance for surprise was excluded. Still the attack was a surprise causing the greatest disorder. What occasioned this surprise? This: two regiments from the left wing of Division Grenier advanced obliquely in a westerly direction towards Mars-la-Tour, thereby forming an acute angle with the French front and preventing the other troops from firing. To this tactical error other adverse circumstances were added. The great disorder and want of discipline, the inattention to the authority of their officers and absolute disregard of the enemy, all tended to facilitate the work of our cavalry. They had not gained control of the battle-field yet when the skirmishers met other French infantry they acted as if celebrating a great victory. They shouted, passed round their canteens, waved their caps and formed in groups around the killed and wounded. Whole companies fell out. Some picked up the wounded and carried them off as prisoners, while others busied themselves with securing the trappings of dead and wounded horses. Order and discipline were gone when our cavalry charged. Success was certain under such circum-

stances. Against less demoralized infantry we would not advise a repetition of the experiment.

The attack of the Guard-dragoons extended only to our right centre where they wheeled to the left, charged through the French infantry and riding around Mars-la-Tour, disappeared behind that village. The front was now clear, all who could crept back, and an insane quick-fire swept over the field, though not an enemy was in sight. As soon as the cavalry had disappeared the French advanced again clearing the battle-field. Some wounded dragoons and some officers and men of F/16 and I, F/57 were captured. A little later the general retreat of the French to their original position began, probably on account of the appearance of the cavalry division Rheinbaben from the direction of Ville sur Yron. They retreated as disorderly as they had advanced. Before them, on the extreme left, could be seen a long black column—the German prisoners.

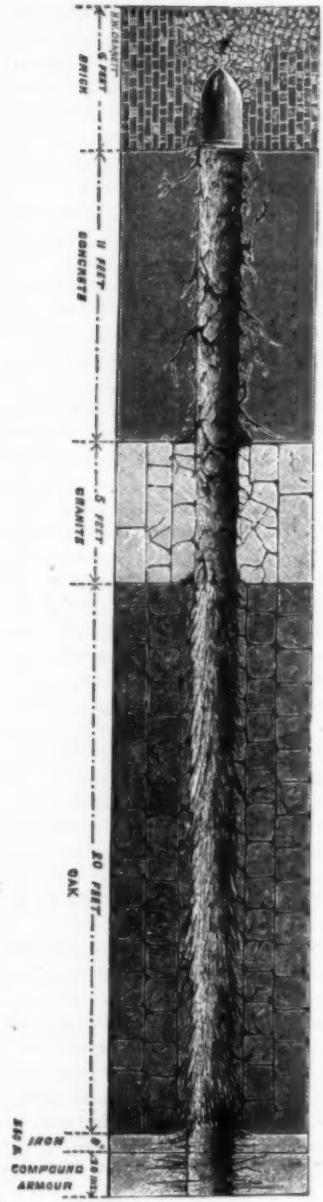
The little success gained by the French on the battle-field of Mars-la-Tour was due to their tactical errors, bad morale and poor discipline.

Military Notes.

"WAR."—BY COLONEL MAURICE.

COLONEL MAURICE'S republished article on "War" raises a problem of surpassing interest to soldiers, and one which at any rate deserves far closer interest from politicians than we fear it is likely to get, for on its correct solution depends to a very considerable extent the fighting efficiency of our own little Army. According to our author it was the introduction of the breech-loader which gave to the battle-fields of France their leading characteristics, which he describes in the following terms: "It is upon the surface of the facts that the extreme loss of life suddenly occasioned at particular points by the effectiveness of the fire of the new weapons, both of artillery and infantry, compelled the gradual abandonment of close formations of men, massed together in dense columns or even in closed lines, and the gradual adoption of what are known as skirmishing or open-order formations. In other words, when the French fire fell upon the solid columns of the Prussians, the columns instinctively scattered. The officers and non-commissioned officers were often lost in very large proportion, and during the actual course of the fighting a method of attack was adopted which proceeded by successive swarms of dispersed men taking advantage of such shelter as the ground permitted." According to another school—the Prussian Staff—not only the above-mentioned characteristics, but also the change in the whole art of strategy and the conduct of war generally, arose as a necessary consequence of the change from dynastic long-service to national short-service armies. The losses suffered, though heavy, were neither extreme nor sudden, as judged by the old Napoleonic standard. Dense columns were not abandoned, for the simple reason that their use was never even contemplated, the isolated instances—two in all, we believe—which anything deserving this appellation actually came under fire being simply the result of mismanagement, and not of design. Closed lines were not given up, but to the end of the war were frequently employed when the circumstances were favorable; and if columns "instinctively" scattered, as they undeniably did sometimes, that was simply due to the fact that, in the time for training the conditions of short service allowed, discipline had not grown strong enough to counteract the "instinctive" desire of self-preservation. Finally, the infantry were habitually prematurely put into action, and their armament was so markedly inferior to that of their opponents, that the fighting assumed a phase of its own, which cannot reasonably be expected

to occur again, and it was to this cause primarily that the disproportionate losses in officers and the resulting confusion was due. It must be admitted that for the moment even the highest authorities seemed unable to suggest a means of securing a higher degree of discipline than they already possessed, and for a time gave a free hand to the tactical nostrum-mongers, who hoped, in some application of the principle of "individual," not "open-order" fighting, to eliminate the element of danger from the battle-field; but a few years' trial sufficed to demonstrate the worthlessness of all of these, and to establish in the minds of the Army at large the principles that all fighting formations must be based on the positive intention of killing the enemy first, that to do so the men must be trained to know how to die themselves, and that the only way to diminish the losses inseparable from fighting was by an adequate training of the superior leaders in the art of handling troops and securing the coöperation of the three arms to one purpose. *The first step taken by headquarters to secure superior discipline was a great extension of power to the company and squadron leaders*, who became personally responsible for the fighting efficiency of their commands, and the fierce competition which ensued soon indicated the next step—viz.: the individual education of the ultimate unit, the soldier, which is the essential feature of their new regulations. At the same time, the headquarter staff endeavored by the education of the officers to remove the impression produced by the earlier essayists, that the losses of the campaign had been either excessive or primarily due to the breech-loader, but that want of judgment in leading had been the essential cause. Further, they pointed out that all "forms" in tactics are never absolutely but only relatively good or bad. In the early stages of an engagement the skill of a Red Indian in skirmishing is in its place; towards the close, when will and nerves on both sides are beginning to fail, the reckless rush of the Soudanee Arab or Afghan Ghazi; and between these limits every conceivable gradation was possible, and could only be judged by the officer on the spot, who therefore must acquire personal influence over his command, and to that end must keep it, when out of the fighting line, in close order on principle—and even in the fighting line itself, when advancing for the decision, the line, though extended at elbow-reach, is no longer fighting in individual order, but entirely in the spirit of the old British line; and since 1874 nothing else but this system of fighting has been visible on any German manœuvre ground. Where this touches our interests is in this—that is, owing to the views quoted above from Colonel Maurice, and on which the instruction of our infantry has been primarily based, we have been deliberately preparing our Army for disaster and not for victory, and wilfully sacrificing the enormous advantage our longer period of service gives to us. We are no supporters of the old barrack-square adjutant's regiment school, but we are absolute believers in the modern German method as actually practised, and are convinced that working on the same lines—viz.: individual education and close-order discipline, with companies and squadrons commanded by their leaders—in seven years' time at our disposal we could again turn out an army fit to fulfill our favorite boast, "to go anywhere and do anything."
—*Army and Navy Gazette.*



PENETRATION OF 110-TON GUN.

It will be remembered that the 110-ton gun firing an 1800 lb. projectile with 960 lbs. of powder has a muzzle velocity of 2105 feet per second, the total energy being 55,305 foot-tons. The figures are sufficiently impressive, but the Elswick authorities have rightly concluded that it would bring the matter much more closely home were there put forward a graphic delineation of what the 110-ton gun can do.

They have, therefore, had made a very realistic drawing of the course through a target of the projectile fired from the *Sanspareil's* 110-ton gun on the 14th of last March. The shot met first of all a 20-inch compound plate. At the back of this was an iron backing plate 8 inches thick, which was fastened to a heavy wrought-iron frame. Beyond was a built-up structure consisting of solid oak baulks. These occupied a thickness of 20 feet. Next came 5 feet of granite, and beyond that was 11 feet of concrete. Finally there was 6 feet of brickwork. The shot struck fairly in the centre of the plate, travelling at a velocity of 2079 feet per second. It went through both plates, then in turn through the 20 feet of oak, the 5 feet of granite, and the 11 feet of concrete, and was finally brought up by the bricks at the end, although it forced out a large wedge of brickwork and almost got through.—*Engineering, London.*

TABLE SHOWING PRINCIPAL DIMENSIONS, ETC., OF U. S. ORDNANCE

MADE AT ARMY GUN FACTORY, WATERVLIET ARSENAL.*

	FIELD ARTILLERY.			SIEGE ARTILLERY.		SEA-COAST ARTILLERY.				
	3.2-inch Steel B. L. Rifle.	3.6-inch Steel B. L. Rifle.	3.6-inch Steel B.L. Mortar.	5-inch Steel B.L. Rifle.	7-inch Steel B.L. Howitzer.	8-inch Steel B.L. Rifle.	10-inch Steel B.L. Rifle.	12-inch Steel B.L. Rifle.	12-inch B. L. Mortar, cast-iron hooped with steel.	12-inch Steel B.L Mortar.
Weight, pounds	829	1230	250	3660	3710	32,311	67,200	115,046	31,920	29,120
Total length, feet	7.5	7.5	2.0	12.1	8.c	23.2	30.6	36.6	10.75	11.7
Length of bore, calibres	26	22.7	5.25	23.5	12.4	32	34	34	9	10
Twist of rifling, calibres	30	35	30	35	35	50 | 25	50 | 25	50 | 25	35	30
Number of grooves	24	24	24	32	40	48	60	72	68	72
Width of grooves, in	.3	.3	.3	.35	.399	.373	.373	.373	.379	.373
Depth of grooves, in	.05	05	.05	.06	.06	.06	.06	.06	.07	.07
Width of lands, in	.119	1.71	1.71	.141	.160	.150	.150	.150	.175	.150
Length of powder chamber, in	10	14	3.9	19.7	10.64	41.25	53.25	62.5	15.57	20.0
Diameter of powder chamber, in	3.8	3.9	3.8	5.7	7.2	9.5	11.8	14.2	12.4	12.5
Length of axis of trunnions, in	14.9	15.5	14.5	21.6	26	44.5	55.5	66.8	56	56
Diameter of muzzle, in.	5.1	6.0	5.4	8.00	10.00	14.0	16.8	21.0	22.5	21.0
Diameter of breech, in	9.25	9.8	7.8	15.00	16.70	30	38.5	46.25	41.75	38
Number of hoops	2	1	0	3	3	14	18	30	13	6
Weight of forgings, pounds		1738	347			40,091	82.002	138,732		
Weight of tube forging, pounds	641	858	302	2421	2169	9612	18,808	32,363		7666
Weight of jacket forging, pounds	776	812		2031	1223	9082	16,870	29,150		9632
Weight of projectile, pounds	13,05	18.86	18.86	42	91	300	575	1000	620	800
Weight of powder, pounds	3.75	4.63	1.00	12.5	9.75	130	256	440	80	100
Length of projectile, calibres	3	3.25	3.25	3	3	3.5	3.5	3.5	2.83	3.5
Initial velocity, f. s.	1700	1554	650	1829	1085	1935	1940	1940	1152	1150
Muzzle energy, total, ft. tons	270	335	59	997	857	7787	15,001	26,089	5796	7334
Muzzle energy per ton of gun, ft. tons	731	610	525	612	519	546	500	508	407	564
Muzzle energy per pound of powder	72	72	59	80	88	60	59	60	72	73
Penetration in Creusot steel at muzzle, in.	....	....	...	....	....	16.5	20.5	25	....	....

*From Watervliet Arsenal.

Reviews and Exchanges.

Royal Engineers' Institute, Occasional Papers, Vol. 15.*

THE appearance of a new number of this series of valuable papers is always welcomed by Engineers, whether belonging to the military or civil branch of the profession; the current number maintains the high reputation of the publication.

The volume contains eight papers, illustrated by fifty-six plates. Four of these papers treat of subjects pertaining to civil engineering, and four are military in character. The former, which our limited space forbids to notice as they deserve, discuss subaqueous foundations (recent improved methods); plans used in keeping the connecting channels between the Ganges and Hooghly rivers open during low water stages, (specially interesting); mathematical and surveying instruments; and works in progress to restore fertility to the plain of ancient Merv, which was rendered a desert more than a century ago by the destruction of a dam which provided for its irrigation.

Of the four military papers one, on Ships *versus* Forts, possesses such interest to our readers that it is republished in the JOURNAL, by the kind permission of the Institute. The others treat of the duties of the Royal Engineers in the field; the Lydd experiments of 1889; and Field Artillery.

The field duties of his Corps are classified and treated by Colonel Wood under ten headings: 1. Landings, water supply, hutting, etc. 2. Roads and communications. 3. Development of the defensible conditions of positions. 4. Demolitions. 5. Siege of fortresses. 6. Bridging. 7. Constructing and working telegraphs. 8. Constructing and working railways. 9. Ballooning. 10. Surveying. Most of the illustrations are drawn from recent experience, and the paper contains useful suggestions for our own service.

The Lydd experiments of 1889 are recounted and analyzed by Major Clarke in his familiar style. The most interesting trials were directed to determining the over-head cover which should be given to casemates to protect them against the fire of 7-inch and 8-inch howitzers, with shells charged with ordinary black powder and with Lyddite. The larger bursting charges were respectively 22¾ pounds of the former and 27½ pounds of the latter. Difficulty was experienced with the delay action fuses with the Lyddite charges, only one detonating and two exploding out of sixteen trials. The practice was at 2000 yards, and "the shooting appears to have been most indifferent." To obtain the data sought recourse was had to shells laid in the desired position and fired by electricity. The deductions drawn by Major Clarke are that sufficient casemate cover against siege projectiles will be afforded by 4 feet of sand or loam, 3 feet of concrete, and two layers of 56 pound rails. Or by 3 feet of sand or loam, 2 feet of concrete, 3 feet of sand or loam, 2 feet of concrete and two layers of 56 pound rails. He, however, states that: "It is necessary to remember that the shell used do not approach in capacity those of which foreign powers have made trial. Thus at Kum-

* *Royal Engineers' Institute, Chatham, England.*

mersdorf and Malmaison, 5 and 6-calibre shell were fired from 21 and 22 cm. mortars, carrying bursting charges of 48.4 lbs. of cotton powder and 72.6 lbs. of melinite." Major Clarke is not impressed favorably with Lyddite as an explosive for shells, prefering black powder.

Neither is he satisfied with the present development of siege matériel in England. He writes: "From the want of any matured scientific opinion, the recent developments of siege ordnance—such as they are—have been in the wrong direction. As has been pointed out in previous years, high-angled fire has been practically neglected altogether. The new B. L. howitzers, with their relatively high velocities, have involved cumbrous mountings and great difficulties as to hold-fasts. It is accurate fire at really high angles with low velocities that we need." It will be noticed that in this opinion Major Clarke is supported by the experience in siege operations during our Civil War. We found it much easier to pass over than to plough through good earthen parapets with our projectiles. The use of hasty intrenchments, so early inaugurated then and so universally adopted now, may extend the application of this principle beyond regular sieges and compel the introduction of rifled coehorn mortars for ordinary field service. Indeed a type mortar of this character is now undergoing test by our Ordnance Department. It weighs 250 pounds and throws a 20-lb. projectile.

Field artillery is treated in a paper by Major-General Brackenbury, prepared for publication since the death of the author. It contains an account of what field artillery has actually accomplished at critical periods in recent wars; remarks upon the matériel of the British service; discusses the supply of ammunition in action; and finally gives the writer's views as to how the guns should be served in connection with the other arms. He sums up the paper with the following conclusions: "1. The power of artillery has increased enormously of late years, and is still increasing, but only on condition that it can march and manœuvre well, and shoot well. Except as a sign of good discipline, it does not matter a straw whether artillery *looks* well. Those German batteries, in 1870, looked very rough indeed. 2. While it is evidently useful to artillery to have protection of earthworks or otherwise at a given moment, it is much more important, on the whole, to make full use of its power of mobility whenever there is an opportunity of snatching a chance of superiority over the enemy; and this applies quite as much to the defense as to the attack. When artillery carries its own defense against shrapnel and rifle bullets, its gain will be enormous. 3. As all regular actions will, as a rule, begin with an artillery duel, it is extremely important that all the guns should, on the march, be well to the front, and that, so far as possible, every piece should come into action at nearly the same time. No reserve of guns is wanted. The whole army is reserve enough. Infantry columns should give way to artillery hurrying to the front. It is going to prepare the way for them. 4. As to distances, zones, and so forth, the best rule for the attack is to get as near the position of the enemy as that enemy will allow, and consistently with the power of having all the guns in a decent position. When the defender begins to yield, if the ground is favorable push guns closer. It is wonderful what a moral effect advance produces. Finally, when the infantry advances, send a strong force of guns with them at almost any risk. * * * 5. Unless directed to retire by superior authority, a line of guns should simply hold its own against all attacks from the front. * * * 7. About escorts for artillery. Undoubtedly, artillery should not, as a rule, be left to act alone, and above all to march alone. But, unless it is detached from the other arms, it requires no special escort, and especially none of infantry, which greatly embarrasses artillery. 8. As to ranges. I will not use my own words, but those of Prince Kraft, who ought to know if anybody does. He says: "The effect of artillery fire is already still noticeable at 5500 yards. The effect of shrapnel begins at about 3800 yards, and at 2000 to 1500 is decisive, while at

1100 to 1000 yards, and under, the effects of artillery is absolutely annihilating." * * * To guard against the enemy's sharpshooters it is well to push forward sharpshooters of one's own, some 500 yards or so in front of the artillery position. This is how infantry can assist artillery far better than escorting it. 9. Smokeless powders have lately been introduced both in France and Germany, and the Ordnance Committee are now experimenting with several kinds. Their decision is likely to come pretty soon, and we shall then, no doubt, have such powders also. I have heard so many times in my life that war was going to be revolutionized that I am sceptical on that head."

It is quite needless to remark that this volume contains matter of interest both to engineer and to artillery officers, and that it well repays perusal. H. L. A.

Rifle Manual and Score Record.*

Colonel James M. Rice, General Inspector of Rifle Practice, Illinois National Guard, has prepared a little volume of less than one hundred pages which he has well named a Range Manual. Twenty-four pages cover the text. The rest is taken up by blank forms to be used by the rifleman, four pages for records of judging distances, and five of judging the velocity and direction of the wind. Forty-three pages are then given to miniature targets, and the record of daily firing such as in the Army is placed in the Individual Score Books. Two pages are given to Records of Skirmish Firing, and a few more to the rules and regulations applying particularly to Illinois State Troops, giving their qualifying scores, classification and reports.

The author says in Par. 8: "This book is not intended to take the place of Blunt's Small Arms Firing Regulations, but if possible to be used in connection with and subordinate to it, although it may be used alone with very great benefit and with abundant success."

His suggestion to note on the diagram of the target at known distance firing not only the point hit and the number of the shot, but by a letter the point where the rifle was apparently pointing when discharged is new, and doubtless would be a valuable help to the practising rifleman. It is easy to recognize the value of constantly keeping before the mind the point really aimed at and the point hit.

The table giving variations of the sights for all ranges to correct for windage, elevation, changes of temperature, etc., and the paragraphs following are a wonderfully practical explanation of the method of applying rapidly, and for every shot the observations of the rifleman on surrounding conditions.

Such notes for handy reference will be found helpful even to the closest student of the rifle firing manual in general use.

The manual is an excellent one for the purpose intended, and the National Guard particularly will find in it much new matter, and by a National Guard Officer of large experience in teaching the principles of accurate shooting. G. H.

* *Rifle Manual and Score Record.* By Colonel James M. Rice, General Inspector of Rifle Practice, National Guard, Ill. The H. W. Rokker Printing House, Springfield, Ill.

BOOKS RECEIVED.

Range Manual and Score Record. By Colonel James M. Rice, General Inspector of Rifle Practice, Illinois National Guard. 1891.

Recollections of President Lincoln and his Administration. By Lucius E. Chittenden, his Register of the Treasury. New York: Harper & Brothers. 1891.

Laws of Athletics. Compiled for the use of the U. S. Army. By 1st Lieut. C. A. L. Totten, 4th Artillery.

OUR EXCHANGES.

ARTICLES OF MORE OR LESS MILITARY INTEREST.

ARGENTINE REPUBLIC.

Boletin del Centro Naval. March and April, 1891.

Revista Cientifico-Militar. October, November and December, 1890.

BELGIUM.

Revue De L'Armée Belge. Rapid Firing Guns and Field Artillery. Studies on Light Infantry, its rôle in the past and in the combat of to-day. Dispersion of Fire. Aerial Navigation Applied to the Art of War. Experiments in Austria for the Determination of a Model Compound Fuse. The Regulations of Infantry and the Conditions which they Should Satisfy.

La Belgique Militaire. Reorganization of the Army. Oblique Fire. Clothing of the Troops. Training of Remount Horses in Thirty Lessons. The Swiss Magazine Rifle. Model. 1889.

ENGLAND.

Proceedings of the Royal Artillery Institution. July, 1891. Some Notes on the Armed Strength of Russia. Royal Artillery Charities. Competitive Practice for Field Artillery.

Journal of the Royal United Service Institution. (Vol. 35, No. 160) The Ranks Compared with Civilian Working Class Life. Recruiting Difficulties. The Condition of the Army Reserve. Heavy Guns and Heavy Shells versus Light Guns and Light Shells. The Use of Railways for Coast and Harbor Defense. (Vol. 35, No. 161) Military Small Arms. Masts and Sails as a Means of Training. The Mounted Infantry Question. The Handicraft of Navigation and Nautical Surveying.

The Army and Navy Gazette. The Artillery "Tactical Exercises" of A Massed Batteries as Instituted at Aldershot. The Mobilization of the Reserve Ship. The Scope and Purpose of the English Manœuvres. Arguments for not Increasing Torpedo Boat Flotillas. The Mobilization of the French Reserve. The Agitation for the Suppression of Corporal Punishment in the French Army.

The United Service Magazine. India, The gift of Sea-Power. Military Criticism and Modern Tactics. Disappearing Guns for Battle-Ships. An English Reply to "A German View of the Defense of India." The Truth about the Yeomanry

Cavalry. Moltke on the Battle of Koeniggrätz. Naval Prize in War—II. The War in Chili. The Recruiting Question.

The United Service Gazette. The Navy and Imperial Defense. The Bombay Army. Increase of the Russian Navy. The Composition of the French Fleet. Purchase Officers of H. M. Army. The Defense of Charleston Harbor.

Minutes of Proceedings of the Institution of Civil Engineers. (Vol. CIV., 1891.)

FRANCE.

Revue Militaire de L'Etranger. (June, 1891. 33d Vol., No. 76) The Rules of Attack in the German Infantry. The Actual Situation of the Reserve Troops in the Russian Army. The German War Budget for 1891-92. The Colonial Forces of Spain; Organization and Personnel; the Army of Cuba; of Porto Rico; of the Philippines; Infantry and Naval Artillery. Naval Forces. Construction of English Coast Batteries. Austrian Naval Manœuvres; the New Austrian Cavalry Carbine. The Belgian War Budget. Danish Experiments with Cellulose to Stop Leaks in Ships. Recent Development of the American Navy. Compulsory Military Service in Holland. Trials of an Armored Turret at Spezia for Coast Defense. Italy's Adoption of the Revolver for Officers' Equipment. Actual Conditions of the Fortifications of Bucharest. Mobilization of the Russian Fleet, 1891. Adoption by Russia of the 7.62 mm. Calibre Small Arm. Project for the Reorganization of the Swiss Army.

Revue du Cercle Militaire. Experiments with Footgear for the French Infantry. Contagious Diseases in the Army. The Mobilization of the French Territorial Army in the Spring of 1891. The Russian Reserve Brigade. German Naval Manœuvres and Mobilization. The Adoption of Field Glasses for the Infantry and Cavalry of Italy.

INDIA.

Journal of the United Service Institution of India. (Vol. 20, No. 85) The Madras Army. The Meywar Bhil Corps. Remarks on Indian and Russian Regimental Interior Economy regarding Followers. The "New Departure" in Infantry Tactics. The Storm of Geok-Tepe.

ITALY.

Revista di Artigliera e Genio. (June, 1891. Vol. 2) On the Strength of the Walls of Docks which Support the Caisson; Investigation of the Causes which Produce Destruction in Dry Docks and the Conclusion. Projectiles Charged with High Explosives for Field Artillery; Study and Purpose of the Magazine; Small Arm of Small Calibre. Efficiency of the Field Artillery and Tactics of the Infantry. Ammunition Wagons for the Infantry on the Battle-field, with cut. The Task and Position of the Field Artillery with the Employment of Smokeless Powder. Experiments to Ascertain the Effects of Splintered Rock and Granite upon Troops Produced by Small Arm Projectiles. Description and cut of a New Signal Lantern. Portable Defenses. The Walfrau Projectile. Accident to a Military Æronaut in France. Nailless Shoes for Army Horses. Experiments to Determine the Velocity of Flight of Projectiles and the Value of Chronometers to Determine Distances. Aluminum Bronze. The New English 4-7 inch Rapid-firing Gun. Defenses of Portsmouth, England. The British Military Strength. The Adoption by Spain of the Small Arm of Small Calibre. The Quality of Powder used in the United States for the Loading of Projectiles; Bursting Charges.

UNITED STATES.

The Century. (July, 1891) Provençal Bull-fights. General Miles' Indian Campaigns. Greeley's Estimate of Lincoln. Arrival of Overland Trains in California in '49

(August) The German Emperor. Cape Horn and Coöperative Mining in '49. Life on the South Shoal Lightship. Two Kings. "Valor and Skill in the Civil War."

Proceedings of the United States Naval Institute. (Vol. 17, No. 2) Disposition and Employment of the Fleet. On a Method for Calculating the Stability of Ships. High Explosives in Warfare. Electro-Metallurgy. The Samoan Hurricane of March, 1889.

Harper's Magazine. (July, 1891) Some American Riders. Briticisms and Americanisms. The Republic of Paraguay. Oliver Wendell Holmes. The Episode of the Marques de Valdeflores. (August) New Zealand. Some American Riders. Lord Byron's Early School Days. Nihilists in Paris. The Vigilantes of California, Idaho and Montana.

The North American Review. (July, 1891) The Farmers' Discontent. Domestic Service in England. Loafing and Laboring. The Inheritence of Property. English Universities and Colleges. The Relations of Literature to Society. The Art of Magic. (August) The Value of Naval Manœuvres. Possibilities of the Steam Yacht. Pensions and Patriotism. The War—Some Unpublished History.

The United Service. (July, 1891) The Efficiency of the Army. A Summer at Fort Columbia. Suggestions on the Reorganization of the Personnel of the Navy. History of the U. S. Frigate *Constitution*. Army Reorganization. (August) The Defense of the Eastern Approach to New York City. "Uncle Man." The British Army in 1891. Running the Gauntlet of Rebel Batteries. Lost in the Bush.

The Popular Science Monthly. (July, 1891) Man and the Glacial Period. Deportment of Savage Negroes. Our Agricultural Experiment Stations. Scientific Dreams of the Past. (August) The Practical Outcome of Science. New Chapters in the Warfare of Science. The Value of Statistics.

The Pennsylvania Magazine of History and Biography. (July, 1891) Itinerary of General Washington from June 15, 1775, to December 23, 1783. The Brunswick Contingent in America, 1776–1783. A Scrap of "Troop" History. Abstract of Wills Recorded in Philadelphia.

Journal of the U. S. Cavalry Association. (June, 1891) The Cavalry at Chancellorsville, May, 1863. The proper Employment of Cavalry in War. The effect of Small Calibre Arms and Smokeless Powder Upon Cavalry Operations of the Future. Further Remarks on the Cavalry Fight on the Right Flank at Gettysburg. Firing at Breast Works of Snow with the Berdan Rifle. Some Thoughts on Equipment. The Stoneman Raid of 1865. A Confederate Cavalry Officer's Views on "American Practice and Foreign Theory."

Outing. (July, 1891) Beyond the Metropolis of the Mountains. Rowing as a Recreation for Women. Boating Life on the Upper Thames. With Rod and Line Through Ireland. The Massachusetts Volunteer Militia—I. The Detroit Wheelmen. (August) Big Guns in Colorado. The Massachusetts Volunteer Militia—II. Photographing in the White Mountains. Grouse Shooting in Ireland. Polo. Camping Out. Camping in the Woods.

Bulletin of the American Geographical Society. (June 30, 1891) Proposed Exploration of North Greenland. Journeys on the Inland Ice. Dr. John Rae's Arctic Explorations.

Railroad and Engineering Journal. (July, 1891) English and American Locomotives. The Trial of the Vesuvius. The Armstrong Rapid-Firing Gun. River Work in India. Thoughts on Marine Engineering—I. A New French Cruiser.

The United States Navy. (August) Thoughts on Marine Engineering—II. Safe High Explosives. Bids for New Army Guns. Technical Schools.

Political Science Quarterly. (June, 1891) Political Ideas of the Puritans. South Carolina and Nullification. Control of National Expenditures. Our International Responsibility.

Transactions of the American Society of Civil Engineers. (May, 1891) The Beginnings of Engineering. Automatic Refrigerator System, Denver. Concrete Sewer at Mt. Vernon, N. Y.

Kansas City Times (To date).

Table Talk (To date).

The Electrical World (To date).

The New York Critic (To date).

Pharmacology of the Newer Materia Medica (To date).

Johns Hopkins University Publications (To date).

The 7th Regiment Gazette (To date).

St. Nicholas (To date).

Monthly Weather Review (To date).

Army and Navy Register (To date).

Philadelphia Weekly Times (To date).

The Boston Courier (To date).

Home and Country (To date).

Transactions of the American Society of Civil Engineers.

Transactions of the Technical Society of the Pacific Coast.

ARTICLES ACCEPTED FOR THE JOURNAL.

Sea-coast Guns and Steel Armor, - By LIEUT. E. M. WEAVER, 2d U. S. Art'y.
Shrapnel Fire, - - - - . By LIEUT. A. D. SCHENCK, 2d U. S. Art'y.
The Magazine Staff and Ammunition Service in a Sea-coast Fort,
By CAPT. JAMES CHESTER, 3d U. S. Art'y.
Infantry Battle Tactics, - - By CAPT. F. H. EDMUNDS, 1st U. S. Infantry.
Post Schools. - By LIEUT. A. C. SHARPE, A. M., Lieut. 22d U. S. Infantry.
The Position-finding and Position-designating Service in Sea-coast Defenses,
By CAPT. JAMES CHESTER, 3d U. S. Art'y.
The Artillery Service in the War of the Rebellion, 1861–65. Fredericksburg, Chancellorsville, Gettysburg, - - - - - By GEN. J. C. TIDBALL, U. S. A.
A United States Army, - By LIEUT. J. B. BATCHELOR, JR., 24th U. S. Infantry.
Mounted Infantry, - - By LIEUT. J. A. PENN, JR., 13th U. S. Infantry.
Compilation of Facts Relating to High Explosives, By COL. J. P. FARLEY, Ord. Dept.

ERRORS IN LIST OF MEMBERS M. S. I. ISSUED IN JULY, 1891.

OMISSIONS.

Griffin, Eugene, capt. eng. corps.

CORRECTIONS.

Brooke-Rawle, W., bvt. lt.-col. U. S. Vols.
Browne, Edward, judge, bvt. capt. N. Y. Vols.
Dawes, E. C., bvt. lt.-col. U. S. Vols.
Gallup, Albert, capt. and signal officer, 1st brig. n. g. S. N. Y.
Lambert, W. H., bvt. major U. S. Vols.
Lawrence, A. B., late lt.-col., chf. qm. 24 A. C.
McMahon, M. T., bvt. m. g. U. S. Vols.
Ordway, Albert, bvt. b. g. U. S. Vols.
Rosengarten, J. G., bvt. capt. U. S. Vols.
Smith, R. Burnett, lt. 11 inf.
Wilson, James Grant, bvt. brig.-gen.

Announcements.

I.

At a meeting of the Executive Council of the Military Service Institution, held on the 8th day of May, 1891, the following resolutions were passed:—

Resolved,—subject to the approval of the members of the Military Service Institution,—that the following provision be added to Section 2, Article V, of the Constitution of the Military Service Institution: "The ex-officers of the regular army who are members of the Military Service Institution shall have one representative in the Executive Council; but no ex-officer of the regular army shall be eligible as a representative from or of any staff corps, department, or branch, of the military service of the United States.

Resolved,—subject to the approval of the members of the Military Service Institution,—that the words "Provided, however, that the number of these associate members shall be limited to 200" shall be expunged from Section 4, Article IV, of the Constitution of the Military Service Institution.

Resolved,—That the Secretary of the Military Service Institution be directed to call a general meeting of the Military Service Institution on the second Friday in September, 1891, for the purpose of considering and voting upon the foregoing resolutions.

II.

In obedience to the requirements of the third resolution above cited, a general meeting of the Military Service Institution is called for Friday, September 11, 1891, at half-past three o'clock, P. M. at Governor's Island, N. Y.

Members who cannot attend are earnestly requested to send their proxies to the Secretary of the Institution, or to some member of the Council.

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Secretary.

Major W. L. HASKIN, 1st U. S. Artillery.

Treasurer.

Lieut. J. C. BUSH, 5th U. S. Artillery.

Asst. Secretary and Vice-Treasurer.

Lieut. GUY HOWARD, 18th U. S. Infantry, A. D. C.

Executive Council.

Term ending 1897.

BATES, A. E., Major Pay Dept.
HAMILTON, JOHN, Colonel, U. S. A.
HUGHES, R. P., Colonel, Insp-General.
RUGGLES, G. D., Col. Adjt.-Genl's Dept., B.-G.
SMALL, M. P., Lieut.-Col. Sub. Dept., B.-G.
WOOD, E. E., Captain 8th U. S. Cavalry.

Term ending 1895.

ABBOT, H. L., Col. Corps Engineers, B.-G.
BARR, T. F., Lieut.-Col. D. J. A. G.
HYDE, J. McE., Capt., Q. M. Dept.
LODOR, R., Lieut.-Col. 1st U.S.Artillery, Col.
MORDECAI, A., Lieut.-Col. Ordnance Dept.
WETHERILL, A. M., Capt. 6th U. S. Infantry.

Term ending 1893.

Finance Committee.

Col. MORDECAI.
Col. SMALL.
Capt. HYDE.

FARLEY, J. P., Lieut.-Col., Ordnance Dept.
KINGSBURY, H. P., Capt. 6th Cavalry.
MIDDLETON, J. V. D., Major Med. Dept.
OTIS, E. S. Col. 20th U. S.Infantry.
TOMPKINS, C. H., Colonel A. Q. M. G., B. G.
WEBB, A. S., Bvt. Major-General, (late) U. S. A.

Library Committee.

Major HASKIN.
Lieut. HOWARD.
General TOMPKINS.

Publication Committee.

Generals ABBOT, RODENBOUGH, Colonels HUGHES, OTIS, and Lieut. BUSH.

Branches.

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Col. J. M. WILSON, Corps of Engineers.

Corresponding Secretary.

Lieut. JOHN P. WISSER, 1st Artillery.

Vancouver Barracks, Wash.

Vice-President.

Colonel T. M. ANDERSON, 14th U.S. Infantry.

Corresponding Secretary.

Capt. C. H. Clark, Ord. Dept.

Fort Leavenworth, Kansas.

Vice-President.

Bvt. Lt. Col. CARLE A. WOODRUFF, Capt. 2d U.S. Art.

Corresponding Secretary.

Lieut. A. L. WAGNER, 6th U. S. Infantry.

Membership and Dues.

(1) "All Officers of the Army and Professors of the Military Academy shall be entitled to Membership *without ballot* upon payment of the Entrance Fee."

(2) "Ex-Officers of the Regular Army, in good standing and honorable record, shall be eligible to full Membership of the Institution, *by ballot* of the Executive Council."

(3) "Officers of the U. S. Navy and Marine Corps shall be entitled to Membership of the Institution, *without ballot*, upon payment of the Entrance Fee, but shall not be entitled to vote nor be eligible to office."

(4) "All persons not mentioned in the preceding sections of honorable record and good standing, shall be eligible to *Associate Membership by a confirmative vote of two-thirds* of the members of the Executive Council present at any meeting, *provided*, however, that the number of these Associate Members shall be limited to two hundred. Associate Members shall be entitled to all the benefits of the Institution, including a share in its public discussions; but no Associate Member shall be entitled to vote or be eligible to office."

Membership dates from the first day of the calendar year in which the "application" is made, unless such application is made after October 1st, when the membership dates from the first day of the next calendar year.

"*An Entrance Fee of Five Dollars* ($5) shall be paid by each Member and Associate Member on joining the Institution, which sum shall be in lieu of the dues for the first year of membership, and on the first day of each calendar year, thereafter, a sum of not less than *Two Dollars* ($2) *shall be paid as annual dues. Annual dues* commence on January 1st in each year."

NOTE.—Checks, Money Orders, or Registered Letters should be drawn to order of, or addressed to, "The Military Service Institution," Governor's Island, New York Harbor. Changes of address should be reported promptly.

Prize Essay—1891.

I.—The following Resolution of Council is published for the information of all concerned:

Resolved, That a Prize of a Gold Medal of suitable value, together with a Certificate of Life Membership, be offered annually by THE MILITARY SERVICE INSTITUTION OF THE UNITED STATES for the best essay on a military topic of current interest; the subject to be selected by the Executive Council and the Prize awarded under the following conditions:

1. Competition to be open to all persons eligible to membership.*

2. Each competitor shall send three copies of his Essay in a sealed envelope to the Secretary *on or before October* 1, 1891. The Essay must be strictly anonymous, but the author shall adopt some *nom de plume* and sign the same to the Essay, followed by a figure corresponding with the number of pages of MS.; a sealed envelope bearing the *nom de plume* on the outside, and enclosing full name and address, should accompany the Essay. This envelope to be opened in the presence of the Council after the decision of the Board of Award has been received.

3. The prize shall be awarded upon the recommendation of a Board consisting of three suitable persons chosen by the Executive Council, who will be requested to designate *the Essay deemed worthy of the prize;* and also in their order of merit those deserving of honorable mention.

4. The successful Essay shall be published in the Journal of the Institution and the Essays deemed worthy of honorable mention, shall be read before the Institution, or published, at the discretion of the Council.

5. Essays must not exceed twenty thousand words, or fifty pages of the size and style of the JOURNAL (exclusive of tables).

II.—The Subject selected by the Council at a meeting held Jan. 14, 1891, for the Prize Essay of 1891, is

"*THE TERRAIN IN ITS RELATIONS TO MILITARY OPERATIONS.*"

III.—The gentlemen chosen by the Council to constitute the Board of Award for the year 1891, are:

Bvt. Major-General HORATIO G. WRIGHT, U. S. A.
General E. P. ALEXANDER, Georgia Central Railroad.
General FRANCIS A. WALKER, President Mass. Ins. of Technology.

WM. L. HASKIN, *Secretary.*

GOVERNOR'S ISLAND,
February 2, 1891.

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* "All officers of the Army and Professors at the Military Academy shall be entitled to membership, *without ballot*, upon payment of the entrance fee. Ex-officers of the Regular Army of good standing and honorable record shall be eligible to full membership of the Institution *by ballot* of the Executive Council.

"Officers of the United States Navy or Marine Corps shall be entitled to membership of the Institution *without ballot*, upon payment of the entrance fee, but shall not be entitled to vote, nor be eligible to office.

"All persons not mentioned in the preceding sections, of honorable record and good standing, shall be eligible to Associate Membership *by a confirmative vote* of two-thirds of the members of the Executive Council present at any meeting, *provided*, however, that the number of these Associate Members shall be limited to two hundred. Associate Members shall be entitled to all the benefits of the Institution, including a share in its public discussions, but no Associate Member shall be entitled to vote or be eligible to office."

U.M.C.

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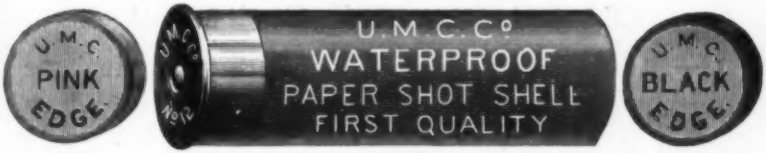

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Subsistence Dept.....GEN. J. W. BARRIGER.
Medical Department.....SURGEON CHAS. SMART.
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3d Cavalry.... ....LIEUT. THOS. B. DUGAN.
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16th Infantry.....CAPT. WM. V. RICHARDS.
17th Infantry.....CAPT. GEORGE RUHLEN, A. Q. M.
**18th Infantry*.....LIEUT. C. H. CABANISS, JR.
19th Infantry..... ...LIEUT. C. C. HEWITT.
20th Infantry..... ....CAPT. J. N. COE.
22d Infantry.....CAPT. O. M. SMITH, C. S.
23d Infantry.....LIEUT. C. H. HEYL.
24th Infantry..... ...LIEUT. H. W. HOVEY.
25th Infantry. .....LIEUT. GEORGE ANDREWS.

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THE EIGHTEENTH REGIMENT OF INFANTRY.

By FIRST LIEUT. CHARLES H. CABANISS, Jr.

18th U. S. Infantry.*

BY direction of the President of the United States, of date May 4, 1861, subsequently confirmed by Act of Congress, July 29, 1861, the infantry arm of the Regular Army was increased nine regiments, numbering from the eleventh to the nineteenth, inclusive; the new regiments to be organized into three battalions each, each battalion to consist of eight companies, the companies of each battalion to be lettered from A to H inclusive.

The organization of the 18th Infantry was begun in compliance with G. O. 16, A. G. O., May 4, 1861, and G. O. 48, A. G. O., July 21, 1861.

Henry B. Carrington, a native of Connecticut, and at this time (1861) a citizen of Ohio, was appointed colonel of the regiment; Captain Oliver L. Shepherd, 3d U. S. Infantry, a graduate of the Military Academy of 1840, and a veteran of the Mexican War, was appointed lieutenant-colonel; Capt. Edmund Underwood, 4th U. S. Infantry, a native of Pennsylvania, whose original date of entry into service was March 3, 1848, was appointed major; and Frederick Townsend, a citizen of New York, was appointed major. All of these field officers dated from May 14, 1861.

The headquarters of the regiment were stationed in Columbus, Ohio, and recruiting commenced on the 1st day of July, 1861. A camp was established, August 10, 1861, about four miles north of Columbus, called, in honor of the Adjutant-General of the Army, Camp Thomas. The organization of companies was commenced in August, and the necessary captains and lieutenants were appointed and ordered to the rendezvous. As was the case in all of the new regiments thus added to the service, nearly all of these gentlemen were from civil life and entered the military service from a variety of unwarlike professions.

On the 30th of November five companies (A, B, C, D, F) of the 1st Battalion, six (A, B, C, D, E, F) of the 2d Battalion, and one (D) of the 3d Battalion, were organized and ready for the field. Colonel Carrington was ordered to proceed with this detachment to Louisville, Ky., and there report to General Buell, who was then engaged in organizing the Army of the Ohio. Colonel Carrington accordingly left Camp Thomas December 2, 1861, the 1st Battalion under Major Underwood, the 2d under Major Townsend.

On the 16th of the same month, at Lebanon, Ky., Colonel Carrington turned over the command to Lieutenant-Colonel Shepherd, and returned to Camp Thomas to complete the organization of the regiment.

* Under the direction of Colonel H. M. Lazelle, 18th U. S. Infantry.

General Buell assigned the 18th Infantry to the 3d Brigade, 1st Division, Army of the Ohio, General George H. Thomas being the division commander. The history of the 18th Infantry during the four momentous years of the Rebellion is so intimately connected with that of General Thomas, that to follow it intelligently, one is compelled to make a study of his campaigns.

The 18th Infantry formed a part of the force under that general, which, in December, 1861, and part of February, 1862, operated against the Confederate forces under Generals A. S. Johnston and George Crittenden, in southwestern Kentucky. Owing to the condition of the roads, the 18th Infantry did not reach the field in time to participate in the battle of Mill Springs, Ky., January 18, 1862.

A. S. Johnston having retired into Tennessee, General Thomas was ordered with his division to proceed by forced marches to Louisville, and thence to embark for Nashville, Tenn. The 18th Infantry reached Nashville March 3, 1862. On the 6th of March Major W. A. Stokes, 18th Infantry, with companies A, B and E, 3d Battalion, and G, 1st Battalion, joined the first detachment of the regiment, but Major Stokes' appointment was not confirmed by the Senate and the 3d Battalion was discontinued, the companies composing it being temporarily attached to the 1st and 2d Battalions.

The regiment, as a part of the 1st Division, Army of the Ohio, marched from Nashville, March 20, to participate in the operations against the enemy's position at Corinth—Savannah, on the Tennessee River, being the point to which its march was directed. During this march the officers and men suffered great hardships. The roads were knee-deep with mud, the weather was stormy, rations were short, shelter could not be obtained at night, and the wagon trains were delayed many days. The command did not reach Savannah until April 8, and was transferred the next day by steamboat to Pittsburg Landing.

On the 24th of April the regiment had its first engagement with the enemy. Having moved camp beyond Shiloh Creek, it was sent on reconnoissance, and drove back the enemy's outposts beyond Lick Creek and Pea Ridge, capturing some prisoners. The commanding general having determined upon the reduction of the enemy's position at Corinth, Miss., the combined Armies of the Ohio, Tennessee and Mississippi, were reorganized and the 18th Infantry passed from the 1st Division, Army of the Ohio, to the 7th Division (General T. W. Sherman) of the right wing (General Thomas) of the Army. It participated in the siege of Corinth (April 23 to May 30) under command of Lieutenant-Colonel Shepherd, who had as adjutant Lieutenant Anson Mills. The detachment consisted of the 1st Battalion, commanded by Captain Henry Douglass until May 28, then by Major J. N. Caldwell. Lieut. R. L. Morris, Jr., was the battalion adjutant and Lieut. D. W. Benham battalion quartermaster. Lieutenant Kinney commanded Company A; Captain Thruston, Company B; Lieutenant Taylor, Company C; Captain Wood, Company D; Lieutenant Proctor, Company F; Captain Hull, Company G; Lieutenant Brand, Company A (3d Battalion); Captain Kellogg, Company D (3d Battalion).

The 2d Battalion was commanded by Major Frederick Townsend. Lieut. F. Phisterer was the battalion adjutant and Lieutenant McCleery, quartermaster. Captain Fetterman commanded Company A; Captain Dennison, Company B; Captain Granger, Company C; Lieutenant Ogden, Company D; Captain Thompson, Company E; Lieutenant Simons, Company F; Captain Belknap, Company B (3d Battalion); Captain Haymond, Company E (3d Battalion).

After the evacuation of Corinth by the Confederates, the Union Army before Corinth was reorganized and the Division to which the 18th Infantry belonged again became the 1st Division under General Thomas.

On the 5th of July the organization of Company G, 3d Battalion, at Camp Thomas, was completed, and with it the organization of the regiment with 24 complete companies.

On the 2d of July the portion of the regiment in the field was augmented by the arrival of companies E, 1st Battalion, and C and F, 3d Battalion, under command of Captain H. R. Mizner, who joined at Iuka, Miss.

The months of June, July and August, 1862, were spent in performing outpost duties and on detached service in Mississippi, Alabama and Tennessee, guarding bridges, towns, trains, etc. During August the army was disposed at different points in Tennessee for the purpose of disputing Bragg's advance into Kentucky, Thomas having been ordered to assume command of the troops at McMinnville, to repair the railroad from Tullahoma to that point as he advanced, and to establish posts of observation with signal stations on the mountains to watch Bragg's movements. The 18th Infantry, now concentrated, was placed en route for Pelham, Tenn., August 21, to guard the mountain passes near that place, reaching its destination August 24. General Buell, believing that it was probable that Bragg would advance on Nashville or Louisville, directed Thomas to hold his forces so disposed as to intercept the enemy's advance on Nashville. Buell gave orders, August 30, for the concentration of his entire command at Murfreesboro, Tenn. His railroad communications north of Nashville had been destroyed by the enemy's cavalry and it was now in order to draw nearer to Nashville, for the purpose of repairing the railroad to the north and opening up his line of communications, and at the same time to make ready a reception for the enemy should he come.

Bragg's movements were conducted with so much secresy, and the Union Army was so deficient in cavalry, that for some time General Buell was in ignorance of the real direction of his advance; and some time before his ulterior designs became manifest to him, the enemy had crossed the Tennessee River at Chattanooga, August 28, moving in a northwesterly direction; crossed the Cumberland River at Carthage and Gainsville, turning the left flank of the Union Army; and was actually threatening Bowling Green, Ky., in its rear, before General Buell learned definitely of his movements. On the 7th of September, 1862, General Buell started in the race of the two opposing armies for Louisville. The shorter lines upon which Bragg was moving, and his start in the race, gave him the advantage. Upon reaching Nashville, Buell left there three of his divisions under

Thomas, as he regarded the holding of Nashville by the Union forces as second only to the safety of Kentucky. He himself pushed on with his remaining three divisions, believing himself to be sufficiently strong to contend with Bragg for Kentucky. On the 10th of September, however, hearing of reinforcements reaching Bragg north of the Cumberland, he directed Thomas to turn over the command of Nashville to General Negley, and to join him with the old 1st Division, of which the 18th Infantry formed a part. On the 17th it encamped near Bowling Green. The two armies were concentrated about the 20th, the enemy in a position of considerable strength on the south side of Green River. After some skirmishing between the opposing lines that evening, the enemy withdrew during the night, his rear guard was driven out of Munfordville next day, and pursued by Buell's advance guard until he turned off towards Bardstown. The 18th Infantry, crossing at Munfordville, pushed on through Elizabethtown, and on the 26th embarked on steamboats, near West Point, for Louisville, which city it reached on the 28th. Marching through the city it bivouacked two miles distant. Colonel Shepherd here turned over the command to Major Townsend.

The Army of the Ohio was again reorganized, and the 18th Infantry was assigned to the 3d Brigade (General Steadman), 1st Division (General Schoepf), 3d Corps (General Gilbert). The enemy's army lay between Bardstown and Frankfort, its front covering a distance of sixty miles. General Buell's plan was to attack the enemy's left flank and force it back beyond any convenient line of retreat, while at the same time to divert his attention from the real point of attack by a demonstration in force against his right. The movement commenced October 1, the 3d Corps moving against the enemy's left, through Shepherdsville, on Bardstown, and forming the centre of the Union line. On the 4th the 18th Infantry bivouacked near Bardstown; on the 6th, engaged the enemy's rear-guard, driving it back beyond Texas, and bivouacked near the latter place; on the 7th, bivouacked near Perryville, Ky. During the engagement of the 8th (battle of Perryville) the regiment was in reserve until about 6 o'clock P. M., when the brigade, the 18th Infantry leading, was ordered to reinforce General McCook. During the advance to its position, and after reaching it, it was exposed to artillery fire for an hour and a half without the opportunity of replying. Bivouacked that night on the battlefield. On the next day the enemy fell back in the direction of Harrodsburg. The 18th was in reserve again. On the 10th passed through Perryville, and on the night of the 11th bivouacked near Harrodsburg. Continued in pursuit until the 15th, when, near Crab Orchard, Ky., the pursuit was abandoned. The Army of the Ohio was then turned towards Bowling Green and Glasgow, preparatory to the advance to Nashville, and Gilbert's (3d) Corps was directed on Bowling Green, towards which place the troops marched. General Buell was now relieved by General Rosecrans, the Department of the Ohio was changed to the Department of the Cumberland, and the Army of the Ohio became the Army of the Cumberland.

General Rosecrans having assumed command of his department on the 7th of December, announced the reorganization of the Army into the right wing

(McCook), the centre (Thomas), and the left wing (Crittenden). The division to which the 18th Infantry belonged passed in the centre, retaining its numerical designation, and under the command of Gen. S. S. Fry. Company H, 3d Battalion, joined the regiment in the field, November 26, from Camp Thomas, Ohio. The detachment of the regiment in the field, December 1, 1862, consisted of companies A, B, C, D, E, F, G and H, 1st Battalion, with A and D 3d Battalion attached; and A, B, C, D, E and F, 2d Battalion, with B, C, E and F, 3d Battalion, attached. Lieut.-Col. Shepherd returned and assumed command about December 10.

The 18th Infantry was detached from the 1st Division of the centre, and on the 25th, proceeding to Nashville, it, together with the 15th, 16th and 19th Infantry, and Battery H, 5th Artillery, were formed into a brigade, and Lieut.-Col. Shepherd assumed command thereof. This "Regular Brigade" was assigned to the 3d Division (General Rousseau) of the centre, Army of the Cumberland.

On the 31st of December, 1862, this brigade, as part of Rousseau's Division, was in reserve in rear of the centre. About 10 o'clock A. M., when McCook had been forced back by Hardee, Rousseau's Division was sent into the fight (Stone's River) on the right of Negley, the regular brigade "under perfect discipline," on the extreme right. The line was formed in a dense cedar brake, through which Cleburne's and McCown's victorious columns were advancing, sweeping everything before them. "The shock of battle fell heaviest upon the regulars; over one-third of the command fell killed or wounded. Steadily, as if on drill, the trained battalions fired by file, mowing down the advancing Confederate lines." But "Guenther's Battery (H, 5th Artillery), could not long check the fury of the charge that bore down upon the flanks, and was fast enveloping the entire command." There was no recourse but to retreat. "At this moment Negley's Division, with empty cartridge boxes, fell back, and Rousseau, finding his flanks exposed, after a heroic fight of over two hours, fell back slowly and stubbornly to the open field where his flanks could be more secure." The advance of Bragg's left wing had brought it into a position at right angles with the original line. The entire strength of his centre, and most of his left, was concentrated upon the angle formed by Rousseau and the right of Palmer's Division. Here the severest fighting of the day took place. The new line had open ground in front of it for some 400 or 500 yards. Rousseau requested Van Cleve with a portion of his division to form on his right, which was done. Against this new line the Confederates, flushed with their victory of the early morning, charged in dense masses. They had, so far, swept everything before them, and felt that final success was within their grasp. "Emerging from the cedars where Shepherd's regulars had been so roughly handled, with yell after yell, in four lines deep, they rushed forward to brush away this new line that barred their path to final victory." But the fire of this new line proved too terrible to resist, and they were driven back with great slaughter. Rallying under cover of the cedars, again and again did they renew the assault, and as often were driven back. Four gallant and finely sustained efforts did they make, each time to meet with a repulse. The "regular brigade" sustained the heaviest blow of the assault.

This position was held until nightfall, when it became one of the advanced lines. Early on the morning of January 1, 1863, the regiment was recalled from the front, and, under the fire of the enemy's artillery, moved from place to place along the centre and right wing wherever its presence seemed most necessary. During the last thirty-six hours of the battle it assisted in throwing up and holding intrenchments commanding the central portion of the field, the occupancy of which, owing to the heavy rains, became one of hardship and trial.

Such was the share borne by the 18th Infantry in the battle of Stone's River. The detachment was commanded by Major Frederick Townsend, and consisted of the 1st and 2d Battalions. The 1st Battalion, Major Caldwell, went into action with 16 officers and 273 men, and on the 31st of December sustained a loss of one officer (Captain Kneass) killed; six officers (Captains Douglass, Wood and Hull, and Lieutenants McConnell, Carpenter and Adair) wounded. Twenty-seven enlisted men were killed and 109 wounded. In his official report Major Caldwell says: "All exhibited the same coolness and unflinching devotion to their country and flag that they had shown on the battle-field of Perryville, Ky." The 2d Battalion, commanded by Major Townsend, went into action with 16 officers and 298 men and sustained a loss of one officer (Lieutenant Hitchcock) killed; five officers (Captains Dennison, Thompson and Haymond, and Lieutenants Ogden and Simons) wounded; 30 enlisted men killed, 98 wounded, 3 captured, 2 missing; aggregate loss, 139. In his official report of the battle, General Rousseau says: "The 18th Infantry were new troops to me, but I am now proud to say we know each other. If I could I would promote every officer and several non-commissioned officers and privates of the brigade of regulars for gallantry and good service in this terrific battle. The brigade was admirably and gallantly handled by Lieut.-Col. Shepherd."

On the 11th of January companies A, C, D and F, 3d Battalion, were temporarily discontinued, and the enlisted men of these companies transferred to the 1st and 2d Battalion; and on the 27th of February companies A and C, 1st Battalion, and B and E, 3d Battalion, were also temporarily discontinued.

During the first six months of 1863, the military operations of the Army of the Cumberland were of a minor character. In performing its share of these operations the 18th Infantry was engaged in throwing up intrenchments, foraging, guarding railroads, towns, and in reconnoissance and outpost duties. After the reorganization of the Army of the Cumberland in January, the 18th Infantry passed into the 14th Army Corps, under its old commander, General Thomas. On the 24th of June, it entered upon the "Tullahoma Campaign" against Bragg's army, and on the 26th of June engaged the enemy at Hoover's Gap, driving him from his position. In this engagement the 18th Infantry was commanded by Captain Thruston, with Lieut. Freeman as adjutant. The 1st Battalion was commanded by Captain G. W. Smith; the 2d Battalion by Captain J. A. Thompson, who, being mortally wounded in charging the enemy's position, was succeeded by Captain Haymond.

The regiment, as a part of the 14th Corps, pursued the enemy toward

Shelbyville, where it was believed that Bragg would either be forced to fight, or to abandon middle Tennessee. He evacuated Tullahoma without accepting battle, and fell back on Chattanooga closely pursued by the Union Army, and reached there during the first week in July. Chattanooga then became the objective of a campaign which commenced on the 16th of August, and in which the 18th Infantry, as a part of the 14th Corps, participated. It crossed the Tennessee River at Bridgeport, Ala., September 10th; and, crossing the Raccoon Mountains and Lookout Mountain, at about dark on the evening of September 18, marched toward the left of the army, marching all night until sunrise. In the meantime, Bragg, ascertaining that the general movement of the Union Army was toward his left and rear in the direction of Dalton, determined to evacuate Chattanooga, and with his army concentrated, to take up a position on the road running south from Chattanooga, fronting the east side of Lookout Mountain, and on the east side of Chickamauga Creek, strike the Union columns as they debouched from the defiles of the mountains, and defeat them in detail. The result was the battle of Chickamauga, fought on the 19th and 20th of September, 1863, in which battle the regiment participated.

On the morning of the first day of the battle, Baird's Division, 14th Corps, to which the regular brigade (General J. K. King) belonged, was on the extreme left of the Union line. About 9 o'clock A. M., the regiment became engaged, and between 10 and 11 o'clock, being attacked from the rear, was compelled to fall back to the crest of an adjoining hill, from which position it repulsed all attacks of the enemy. On the 20th it became engaged early in the morning; about noon, charged and drove back the enemy over half a mile, but not being supported on either flank had to fall back to its original position. About 5 P. M., the enemy made a heavy attack, turning its left and almost enveloping the regiment. This necessitated its falling back until its flanks were secure, fighting desperately during the movement. That night the regiment was ordered back to Rossville, where it took position in the gap in Mission Ridge, covering the passage of the army. This position it held until the morning of the 22d, exposed to continued and heavy artillery fire. The army having passed, the regiment fell back early in the morning of the 22d to Chattanooga.

In the battle of Chickamauga the regiment was commanded by Captain G. W. Smith, who also commanded the 1st Battalion. His adjutant was Lieut. Neill. The 2d Battalion was commanded by Captain Haymond, Captain Ten Eyck being second in command. The 1st Battalion consisted of Companies B, D, E, F, G, and H, with G and H, 3d Battalion, attached, commanded by Lieuts. Harding, Adair, Little, Brand, Bennett, Captains Mills and Taylor, and Lieut. Powell; with Lieut. Freeman, adjutant. The 2d Battalion consisted of Companies A, B, C, D, E, F, G, and H, commanded by Lieuts. Sutherland, Kirtland, Gates, Truman, Hutchinson, Ostrander, L. F. Brown and Davis, with Lieut. Lind as adjutant. The 1st Battalion lost one officer (Lieut. Lane) killed; three (Lieuts. Neill, Brand and Adair) wounded; and two (Lieuts. Freeman and Bennett) missing; 29 enlisted men killed, 73 wounded, and 39 missing. The 2d Battalion lost

one officer (Lieut. Truman) killed; two (Lieuts. Hutchinson and L. F. Brown) wounded; and three (Captain Ten Eyck and Lieuts. Gates and Pohlman) captured; 13 enlisted men killed, 64 wounded, 14 missing and 48 captured. From this time until November 22, the regiment was engaged in throwing up intrenchments, grand guard duties, and furnishing details for fatigue and train guards.

On the 22d of November the regiment left its camp near Chattanooga to participate in the battle of Chattanooga. The Union Army had again changed commanders, General Grant being now in command. He determined to dislodge the enemy from his strong position on Lookout Mountain and Mission Ridge. About noon on the 25th the regiment was ordered to participate in the assault upon Mission Ridge. Its share in this engagement is best given by quoting from the official report of Captain G. W. Smith, who commanded the 18th Infantry in the action.

"I was ordered to join the 2d Brigade, 1st Division, 14th Corps, on the right of the Rossville road near the picket lines. The battalions were assigned a position in the second line and on the right of the brigade, covering the 15th U. S. Infantry. The whole soon moved forward, crossing the Rossville road, and steadily advanced toward the Missionary Ridge. About half a mile from the base of the ascent we emerged from a dense wood upon an open plain, which was crossed under a heavy fire of the enemy's batteries advantageously posted upon the heights, and exposed to a fire of musketry from the line of earthworks held by him immediately at the base of the hills. The works were speedily cleared by the skirmishers from the first line, and the 1st Battalion of the 15th Infantry having swept to the right, my command closed up the space thus left. The line of battle halted a few moments for breath among the huts of a camp from which the enemy had been driven, when, finding the fire of shell and spherical case shot concentrating upon us, I almost immediately gave the order to resume the advance. The command was obeyed with the zeal and alacrity which these gallant troops have ever shown, and the line pushed onward and upward, exposed to a galling fire from an earthwork about half way up the side of the ridge. From this the enemy was soon dislodged, and behind this work the command again halted for breath, as well as to pour a destructive fire upon the retreating masses of the enemy. At the command the line again started toward the summit, crowned by a carefully constructed line of works from which the heavy forces of the enemy poured their fire. The ground was now so steep that I was compelled to dismount. Still the troops toiled upward until the heights were carried, the 1st Battalion planting its colors upon the earthworks, the first of the demi-brigade. And there could be no more glorious exhibition of gallantry than that made by the troops of my command at the assault of the Missionary Ridge."

On the 26th, pursued the enemy, taking the Ringgold road and crossing the extreme left of the Chickamauga battle-field, and about 7 P. M., as part of the regular brigade, surprised the enemy's rear-guard near Graysville, Ga., capturing four guns, one caisson, and 150 prisoners.

During the winter and the early spring of 1864, the 18th Infantry was engaged upon several operations of minor importance, and remained in the

vicinity of Chattanooga. On the 7th of May it entered upon its last campaign, the memorable "Atlanta Campaign" of General W. T. Sherman, one so familiar to all that it is unnecessary, in sketching the movements of the regiment and its share in the marches and combats, to outline the movements of the contending armies.

The 18th Infantry formed part of the 2d Brigade (General J. H. King) 1st Division (General R. W. Johnson), 14th Corps (General J. M. Palmer, Army of the Cumberland. It moved on the enemy's position near Resaca, Ga., May 13, driving his outposts into their main works; it was relieved at night and ordered to the left. On the 14th the regiment again advanced, and, after a sharp contest, drove the enemy into his main works and, taking position on the brow of a range of hills, threw up fortifications, exposed during the time to a heavy artillery fire. On the night of the 15th the enemy attacked and was repulsed. Following the enemy in his retrograde movement towards Atlanta, the regiment next participated in the battle of New Hope Church, Ga., beginning May 27, and extending to June 5, during which days the command was exposed to continual artillery and musketry fire. From June 12, to June 18, it was engaged in advancing on the enemy's position, fortifying from time to time. The regiment, still advancing, moved against the enemy's lines on Kenesaw Mountain, relieved the brigades on the front, and was in turn, relieved and placed in reserve.

During the battle of Kenesaw Mountain the regiment was under fire, and several times occupied very important positions. On the 3d of July it entered upon the pursuit of the retreating enemy, overtaking him near Neal Dow Station. Engaged the enemy, July 4, near Smyrna Station, Ga., and during this day was exposed to heavy artillery fire, after which it continued the pursuit to the Chattahoochee River.

On the 8th of July, the sixteen companies, which up to this time had been operating as two battalions, were, for tactical purposes, consolidated into one battalion of eight companies.

Crossing the Chattahoochee, the 18th participated on the 20th of July in the battle of Peach Tree Creek, supporting the 1st Brigade, 1st Division, 14th Corps. On the 22d it joined the division to which it belonged and marched to within a mile and a half of Atlanta, fortifying near the Atlanta and Chattanooga R. R., in which position it remained until August 3, when it marched to the extreme right of the army, participating in a movement extending our lines and covering the right flank of the army. On the 4th of August drove the enemy's pickets and videttes until dark, and on the following day, in connection with the division, made a reconnoissance in force and on the same night marched back to the left, taking position on the right of the 15th Corps, relieving a division of the 23d Corps. On the 7th of August the regiment took part in the battle of Utoy Creek, Ga. During the siege of Atlanta, it was continually under the enemy's fire. August 19 and 20, it supported the 23d Corps and cavalry in the movement against the Atlanta and West Point R. R. On the 26th it took part in the flank movement which culminated in the battle of Jonesboro', and resulted in the fall of Atlanta. On the 1st of September it was engaged in the battle of Jonesboro', from noon until evening; charged the enemy's works, took his

first line, and although unable to hold that line, kept the enemy from re-occupying it until Union reinforcements arrived upon the field.

The regiment remained in the vicinity of Atlanta until September 28, when it left for Chattanooga, where it arrived on the 30th, and then marched to Lookout Mountain and encamped on the southern slope for the remainder of the year 1864.

On the 22d of October, pursuant to S. O. 320, A. G. O., Companies B, D, E, F, G and H, 1st Battalion, and G and H, 3d Battalion, were temporarily discontinued, and the enlisted men were transferred to the 2d Battalion, leaving it as the only organized portion of the regiment. As a part of the regular brigade, it remained at its post on Lookout Mountain during the first six months of 1865.

During its field service the 18th Infantry lost three officers and 122 enlisted men killed, 29 officers and 608 enlisted men wounded, 7 officers and 199 enlisted men captured; a total loss of 39 officers and 929 men. From the 23d of April, 1863, there were no field officers serving with the regiment in the field, and it was commanded by captains, as follows: Captain Eyster to June 14, 1863; Captain Thruston to July 21, 1863; Captain Smith to June 14, 1864; Captain Lyman Kellogg to September 1, 1864; Captain Hull to September 28, 1864; Captain Mills to October 20, 1864; Captain Mizner to October 22, 1864.

After the First and Third Battalions were discontinued, the Second Battalion was commanded until January 10, 1865, by Captain H. R. Mizner; to June 30, 1865, by Captain Chambers. The regimental adjutants were in turn Lieutenants Cash, Mills, Sutherland, Phisterer, Hull, Morris and Freeman, and when the two battalions were discontinued, Lieutenant Bisbee, who was at that time adjutant of the 2d Battalion.

The reorganization of the 1st Battalion was commenced at Camp Thomas, Ohio, September 30, 1865, in accordance with instructions from the War Department; and concluded at Jefferson Barracks, Mo., December 21.

Companies B, C, D, E and G left Camp Thomas, November 6, for Fort Leavenworth, where they arrived, November 20, and were ordered by Colonel Carrington to report to General Elliott, commanding the District of Kansas. In compliance with orders from General Elliott the command left Fort Leavenworth under Captain Hull, November 24, to march to their designated posts in Kansas and Colorado. On this march the command suffered severely owing to the continuous cold, snow and sleet, and upon arriving at Fort Ellsworth, Kansas, the battalion commander determined to await milder weather before proceeding further. Companies A and K, under Captain Mills, left Jefferson Barracks, December 8, and on the 18th left Leavenworth for their designated posts in Kansas, encamping on the 31st at Fort Ellsworth. On the 31st of December, Company F of the 1st Battalion was still at Jefferson Barracks.

The 2d Battalion remained as a part of the regular brigade stationed on Lookout Mountain until the brigade was broken up in August, 1865, when it was ordered to proceed to Louisville to report to General Palmer for duty. It left Lookout Mountain August 26. The Battalion left Louisville,

November 3, accompanying the headquarters of the regiment, and proceeded to Fort Leavenworth; and on the 26th of November left Leavenworth for Fort Kearny. This march was very severe on account of the continuous cold and snow storms. It reached its destination December 11, and three companies were sent to Fort Cottonwood, Neb.

The reorganization of the 3d Battalion was not begun until December 29, 1865, and on the 31st only one company (H) was organized.

During January, February and March, the headquarters of the regiment remained at Fort Kearny, Neb.; the 1st Battalion was on duty in Kansas and Colorado; the 2d Battalion in Nebraska; and the 3d Battalion undergoing organization and instruction at Jefferson Barracks.

During the month of March, the reorganization of the 3d Battalion was completed, and it left Jefferson Barracks for Fort Kearny, April 20. In May Colonel Carrington assumed command of the Mountain District, Dept. of the Platte, and the headquarters of the regiment were transferred to Fort Sedgwick, Col., with the 2d Battalion. The 1st Battalion was on duty in Colorado, Utah and Dakota, and the 3d Battalion was on the march to Sedgwick, which it reached May 31, 1866. During the remainder of the year the regiment was on duty in Dakota, Utah and Colorado, performing the usual garrison duties, furnishing escorts for the U. S. mail, for hay and wood trains, and also in scouting against hostile Indians. At times the hostiles were so bold as to attack the herds in the immediate vicinity, and in sight of the garrisons, of some of the posts in Dakota.

On the 21st of December, 1866, 50 enlisted men of Companies A, C, E, F and H, 2d Battalion, under Captain Fetterman and Lieut. Grummond, and accompanied by Captain F. H. Brown, were sent out from Fort Phil Kearny to relieve the wood train which was reported attacked by Indians. The detachment came up with and attacked the Indians, who appeared to be in small force and who fled. Captain Fetterman pursued, and was led into an ambush about three miles from the post on the Virginia City road. It is supposed the command was suddenly surrounded from the ravines by a large body of Indians, estimated at 3000, and the entire detachment, officers and men, massacred. Constant firing being heard in that direction a party was sent to reinforce Captain Fetterman, but before they arrived on the field the massacre was completed.

In compliance with G. O. 92, A. G. O., 1866 (pursuant to Act of Congress of July 28, 1866), the following changes took place in the regiment during the month of December. The companies of the 1st Battalion became a separate regiment, retaining the designation "18th Infantry." The 2d Battalion became the 27th Infantry, and the 3d Battalion the 36th Infantry. The officers of the reorganized 18th Infantry were Col. Carrington, Lieut.-Col. Wessells, Major VanVoast, Captains Kellogg (L. M.), Ogden, McCleery, Morris, Ten Eyck, Hull, Mills and Hughes; 1st Lieutenants Carpenter, Hyer, Kellogg (S. C.), Wilcox, Brent, Adair, Bell and Skinner; 2d Lieutenants Bradley, Counselman, Hibbets, True, Wood and Galbreath.

During the years 1867-68, and part of 1869, the regiment remained in the Department of the Platte, and its duties were practically unchanged.

In May, 1868, the headquarters were moved to Fort D. A. Russell,

Wyoming, and the companies were distributed along the line of the Union Pacific R. R. and its immediate vicinity. In January, 1869, headquarters were removed to Fort Sedgwick, Colorado. On the 1st of April, 1869, Colonel Carrington turned over the command of the regiment to Major Van Voast, and proceeded to his home to await orders.

In compliance with S. O. 53, Department of the Platte, issued in pursuance of S. O. 17, A. G. O., 1869, the regiment left the Department of the Platte, under command of Major Van Voast, and proceeded to Atlanta, Ga., for consolidation with the 25th Infantry. The regiment arrived at Atlanta, April 15, and was consolidated with the 25th Infantry, April 28. The officers of the new organization were Colonel T. H. Ruger; Lieutenant-Colonel E. Upton; Major J. Van Voast; Captains E. R. Kellogg, M. L. Ogden, J. Christopher, R. L. Morris, Jacob Kline, F. H. Torbett, R. B. Hull, Anson Mills, C. A. M. Estes and James Stewart; 1st Lieutenants C. H. Potter (adjutant), J. H. Baldwin (quartermaster), G. W. Wood, J. H. Bradley, F. F. Whitehead, T. H. B. Counselman, Cass Durham, C. R. Paul, G. J. Madden, H. H. Adams, J. K. Hyer and W. A. Miller; 2d Lieutenants F. B. Taylor, R. S. Egelston, H. H. Benner, T. M. Canton, G. S. Hoyt, J. H. Todd, F. H. Barnhart, R. F. Bates, C. B. Hinton and John Anderson.

The headquarters of the regiment remained at McPherson Barracks, Atlanta, Ga., until August, 1871, when they were removed to Columbia, S. C. The companies of the regiment during that time, besides the usual garrison duties at their several stations in the States of Georgia and South Carolina, were employed in assisting the civil officers in preventing violations of the Federal laws, and in the enforcement of the same.

In August, 1871, Colonel Ruger relinquished the command of the regiment to Lieutenant-Colonel H. M. Black (who had been assigned to the regiment July 1, 1870, vice Upton), and reported at West Point, N. Y., as superintendent of the U. S. Military Academy.

The regiment remained in the Department of the South until April, 1879, serving the greater portion of the time in Georgia and South Carolina. In September, 1874, Companies A, G and I were sent to New Orleans as part of the military force ordered to that city to assist in the suppression of serious riots growing out of political and race differences. In December of that year the companies so detached had rejoined their proper stations.

In the latter part of the year 1876, the entire regiment was in South Carolina, called thither owing to serious apprehensions on the part of the Federal and State officials that there would be a race conflict during the existing political campaign of that year. Companies and detachments were dispatched to different portions of the State, to aid, by their presence, in preserving the peace and preventing blood-shed. In December, 1876, three companies were sent on a brief tour of detached service to Florida, to assist in the enforcement of the law and the preservation of order. During the first six months of 1877, the entire regiment served in South Carolina.

In July of that year, the Governors of Indiana, West Virginia, Maryland and Pennsylvania, having called upon the President for aid in suppressing the serious riots in those States growing out of railroad and labor troubles, the 18th Infantry, with the exception of one company at Atlanta

and one company sent to take station at Chattanooga, was sent to different points in the above-named States; and the several companies so detached remained on this duty until November, when the Headquarters, Staff, Band, and Companies C, D, E, F, G and K, took station at McPherson Barracks; Companies H and I at Newport Barracks, Ky., Company A remaining at Chattanooga.

In April, 1879, the regiment was transferred from the Department of the South to Montana. Proceeding by boat up the Missouri River the regiment landed, May 4, at Coal Banks, Montana. Companies B and E remained at the landing to guard the stores, and the remainder of the regiment marched to the site of Fort Assinniboine and went into camp. From May till September the troops were engaged in furnishing escorts between the post and the landing, in the usual guard duties, and in assisting in the erection of the new post, Fort Assinniboine.

In January, 1881, Companies C, D, E and K, left Fort Assinniboine, forming part of the command under Captain Morris, sent down Milk River for the purpose of intercepting and attacking a party of hostile Sioux under Sitting Bull. The command returned to Fort Assinniboine in February, having failed to meet the hostiles, who had escaped across the boundary into the Dominion of Canada. The officers and men suffered severely from the intense cold, which, until the last day's march, was at all times many degrees below zero. During 1881 the companies stationed at Fort Assinniboine were frequently sent into the field to drive British Indians and half-breeds across the boundary line, and to prevent their intrusion upon the reservation of our friendly Indians. This service, while inglorious, was at all times disagreeable, and was often attended with great suffering on account of the intense cold of that latitude during the winter season, a season during which much of this service was performed.

About June 1, 1885, the regiment, under command of Lieut.-Col. J. J. Coppinger, left Montana, and proceeded to the Department of the Missouri. The Headquarters, Staff, Band and Companies E and F, were assigned to station at Fort Leavenworth; Companies A, B and D, at Fort Hayes; C and I, at Fort Gibson; and G, H and K, at Eort Reno. Colonel Ruger assumed command of the regiment, post of Fort Leavenworth, and the U. S. Infantry and Cavalry School, June 29, 1885.

On the 19th of March, 1866, Colonel Ruger was appointed a Brigadier-General, U. S. Army, and was succeeded in the command of the regiment by Colonel John E. Yard. In May, 1886, the Headquarters, Staff and Band were transferred to Fort Hayes, Kansas.

Colonel Yard died at Fort Hayes on the 17th of February, 1889, and was succeeded by Colonel Henry M. Lazelle, who joined in October of that year.

During the month of April, 1889, Companies F, G and K were ordered from their respective stations for field service in Oklahoma.

In October, 1889, Headquarters, Staff, Band and Companies A, B, C, E, G, H and K left their respective stations and proceeded to the Camp of Instruction, Camp Schofield, I. T., for instruction in field duties, etc.

The 18th Infantry having been relieved from duty in the Department of

the Missouri, and assigned to duty in the Department of Texas, with station at Fort Clark, the Headquarters, Staff, Band and Companies A, B, C, E, G, H, I and K, under command of Major G. K. Brady, left Camp Schofield after the conclusion of the field exercises, and proceeded thither. Company D from Fort Hayes, and Company F from Fort Lyon, arrived at Fort Clark in November, 1889.

In pursuance of G. O. 76, A. G. O., 1890, Companies I and K were skeletonized, the enlisted men being transferred to other companies.

The entire regiment is now serving at Fort Clark, Texas.

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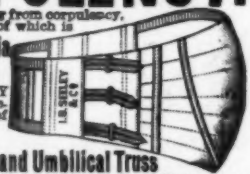

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